S. HRG. 115–163

OVERSIGHT OF THE NUCLEAR REGULATORY COMMISSION

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

DECEMBER 13, 2017

Printed for the use of the Committee on Environment and Public Works

Available via the World Wide Web: http://www.govinfo.gov

U.S. GOVERNMENT PUBLISHING OFFICE

28–623 PDF WASHINGTON : 2018

For sale by the Superintendent of Documents, U.S. Government Publishing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED FIFTEENTH CONGRESS
FIRST SESSION

JOHN BARRASSO, Wyoming, *Chairman*

JAMES M. INHOFE, Oklahoma	THOMAS R. CARPER, Delaware
SHELLEY MOORE CAPITO, West Virginia	BENJAMIN L. CARDIN, Maryland
JOHN BOOZMAN, Arkansas	BERNARD SANDERS, Vermont
ROGER WICKER, Mississippi	SHELDON WHITEHOUSE, Rhode Island
DEB FISCHER, Nebraska	JEFF MERKLEY, Oregon
JERRY MORAN, Kansas	KIRSTEN GILLIBRAND, New York
MIKE ROUNDS, South Dakota	CORY A. BOOKER, New Jersey
JONI ERNST, Iowa	EDWARD J. MARKEY, Massachusetts
DAN SULLIVAN, Alaska	TAMMY DUCKWORTH, Illinois
RICHARD SHELBY, Alabama	KAMALA HARRIS, California

RICHARD M. RUSSELL, *Majority Staff Director*
GABRIELLE BATKIN, *Minority Staff Director*

C O N T E N T S

OVERSIGHT OF THE NUCLEAR REGULATORY COMMISSION

WEDNESDAY, DECEMBER 13, 2017

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The Committee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Building, Hon. John Barrasso (Chairman of the Committee) presiding.

Present: Senators Barrasso, Inhofe, Capito, Fischer, Rounds, Carper, Whitehouse, Markey, and Duckworth.

OPENING STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Good morning. I call this hearing to order.

Today's oversight hearing will be looking at the Nuclear Regulatory Commission, the NRC. I would like to welcome Chairman Svinicki, Commissioner Baran, and Commissioner Burns. I am sad to say that the Commission remains without its full strength of five Commissioners. This is a situation I am eager to resolve. I continue to believe that the Commission functions best with all five Commissioners in place.

I am a strong supporter of nuclear energy as a vital component of an all of the above approach to American energy. For our country to continue to benefit from nuclear energy, we need the NRC to be an effective, efficient, and predictable regulator.

The NRC's efficiency principle of good regulation states, "The American taxpayer, the rate paying consumer, and licensees are all entitled to the best possible management and administration of regulatory activities." I agree. It is our Committee's responsibility to assess the agency's performance. Where the NRC's safety mission is paramount, the NRC must execute that mission in a fiscally responsible and timely fashion.

My home State of Wyoming plays a key role in the American nuclear energy supply. It produces more uranium than any other State. I want to commend the Commission for agreeing to extend the duration of uranium recovery licenses from 10 years to 20 years. This is an important recognition that the regulatory burden placed on these facilities is disproportionately high given how the NRC considers their operations to be "low risk."

The growth of this regulatory burden is clear in the monthly report. The NRC is taking far longer to make uranium recovery decisions than it did 10 years ago. This general lack of urgency is troubling.

As uranium producers struggle with depressed prices and U.S. uranium production is at levels we have not seen since the early 1950s, the need for timely decisionmaking from the NRC is greater than ever.

The NRC is also lagging in its progress toward instituting flat fees for routine uranium recovery licensing actions. These would be fees on uranium producers by the NRC that would not increase.

Four years seems to be an inordinate amount of time for the NRC to institute flat fees, given that some of the NRC's agreement States—States that have assumed responsibility for regulating their uranium recovery facilities—already have flat fees in place.

Wyoming is seeking to become an NRC agreement State and assume responsibility for regulating its uranium recovery facilities. While this will be a positive step for Wyoming and its uranium producers, it is also a strong verdict on the need for the NRC to improve its performance.

Improving performance was the goal of the NRC's Project Aim 2020, "to transform the agency over the next 5 years," it says, "to improve the effectiveness, efficiency, and agility of the NRC."

Unfortunately, Project Aim 2020 seems to be ending prematurely. The most recent Project Aim status report indicates the NRC will complete the vast majority of action items early next year, and the NRC staff will no longer report on it.

Project Aim 2020 is becoming Project Aim 2018, yet the challenges facing the NRC remain. These include premature closures of nuclear power plants, decreased licensing work at the NRC, and declining new reactor reviews at the NRC.

The NRC must continuously strive to improve its performance. This requires diligent leadership from the Commission. I look forward to having a discussion today with the Commission about these important issues.

Following the opening statement by Ranking Member Carper, we will continue with the Committee's practice of a 5 minute opening statement from Chairman Svinicki and then 2 minute statements from each of the Commissioners.

With that, I would now like to turn to the Ranking Member for his statement.

Senator Carper.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Thanks, Mr. Chairman.

Welcome to the Chairman and the Commissioners this morning.

A special thanks to our Chair for pulling this together. I think it is a timely hearing, one that we need to have. As you know, this industry faces real challenges these days, but there are still real opportunities that this industry can help us to address.

The nuclear industry is at something of a crossroads, as we know. The path the industry decides to take will have ramifications not just for the industry but for our country and for the citizens of our country, I think, for decades to come.

Let me begin by noting that it is important to examine the benefits as well as the drawbacks of nuclear energy. First and foremost, nuclear power helps curb our nation's reliance on dirty fossil fuels

and reduces our air pollution that threatens our health and our climate.

Second, nuclear energy has been continued to be a real economic driver in many places around the country. It creates construction jobs, manufacturing jobs, and operations jobs for communities across the nation.

Despite all the benefits of nuclear power, I would be remiss not to mention some of the potential consequences of nuclear energy. We have seen from serious incidences in places like Fukushima the damage that nuclear power can cause if the proper safety precautions are not in place, up to date, or not strictly followed.

With nuclear energy, safety has been and must remain a top priority in the operation of nuclear reactors. Let me repeat that. With nuclear energy, safety has been and must remain a top priority in the operation of nuclear reactors.

That is a primary responsibility of this Committee, especially the Nuclear Regulatory Subcommittee, of which in the past, I have been a member, for many years actually.

Unfortunately, the cost of safety precautions, along with the cost of construction, operations, and maintenance for current nuclear reactors can be expensive, as we know, especially when compared to the cost of other sources of energy such as natural gas.

In fact, some U.S. reactors are retiring sooner than expected due to market forces. At the same time, our country's nuclear reactors are getting older and will need to be replaced in the years to come.

Building new reactors—as we have seen in Georgia and South Carolina—has proven more difficult than predicted a decade ago. As most of my colleagues know, I often try to see the glass half-full. I believe the challenges the nuclear energy faces today can make it stronger and more efficient tomorrow, and frankly, make our nation stronger.

If our country is smart, we will replace our aging nuclear reactors with new technology developed in this country that is safer, that produces less spent fuel, and is cheaper to build and to operate.

If we seize this opportunity, the U.S. can be a leader in nuclear energy again, as we once were, reaping the economic and clean air benefits that flow from that leadership. In order to do so, we must make sure that the NRC has the resources it needs to review these new technologies and make certain our current nuclear reactor fleet continues to be operated safely.

Since joining this Committee I have worked closely with a number of our colleagues to strengthen the culture of safety within the U.S. nuclear energy industry. In part due to our collective efforts, the NRC leadership, and the Commission's dedicated staff, the NRC continues to be the world's gold standard for nuclear regulatory agencies.

Success at any organization starts with the leadership at the top. I must say I have been quite impressed with the current Commissioners at the NRC and its members' ability to work together.

I especially want to applaud Kristine Svinicki, for her leadership, the long membership and service that she has provided at the NRC, especially as our Chair.

Each Commissioner brings a unique set of skills to the Commission, which has served the NRC, and I think, our country very well. These three Commissioners have done an excellent job. However, having a full complement of NRC Commissioners would be ideal.

As my colleagues know, our Committee has reported out several quality NRC nominees, including Jeff Baran's renomination, that await Senate confirmation. I hope we can quickly confirm all three of the NRC nominees, giving the nuclear industry critical regulatory certainty at a time when there is much uncertainty in other areas.

An organization also needs a strong and dedicated work force with the necessary resources in order to be successful. At one time, the NRC year after year ranked as the top place in the Federal Government to work. Now, at No. 11, that is better than a lot of other agencies, but it is not No. 1. Part of what I want us to talk about is how we get the NRC headed back to the top.

Budget cuts and uncertainty in the nuclear industry play a big role in this change, and I look forward to hearing from all of you about these issues. Most importantly, I want to hear what more we can do to better retain and recruit a quality work force at the NRC which is still revered across the globe.

I will close with this thought. Martha and I have two sons. They were both Boy Scouts, probably Eagle Scouts. I used to take them down to the Norfolk Naval Station. I am a retired Navy Captain, former naval flight officer.

I would take them down to the Norfolk Naval Station about every 3 or 4 years, 25 or 30 of the Scouts and some of the adult leaders. We would spend the weekend at Norfolk Naval Station and had the opportunity over a weekend to sleep in the barracks, eat in the galley, and visit ships, submarines, and aircraft carriers.

One morning, we visited the *Teddy Roosevelt*, one Sunday morning at Norfolk Naval Station. The captain of the ship came to meet with us, took us up on the bridge and addressed our Scouts and the adult leaders.

He said these words, talking to our Scouts, "Boys, when the *Teddy Roosevelt* goes to sea, it is 1,000 feet long," and the boys went oooh. He said, "Boys, when the *Teddy Roosevelt* goes to sea, it carries over 5,000 sailors," and the Scouts went oooh. He said, "Boys, when the *Teddy Roosevelt* goes to sea, it carries onboard 75 aircraft." The boys went oooh. He said, "Boys, when the *Teddy Roosevelt* goes to sea, it doesn't refuel for 25 years." The adults went oooh. They tell that story again today.

We have challenges with respect to nuclear energy. No doubt about that, but it is also a great opportunity. That is just one of them. That is just one of them.

I spent many years in the Navy tracking submarines, nuclear submarines, and a lot of nuclear parts on ships. I do not know of a single fatality to the Navy personnel because of failure of the nuclear power plants on those ships, vessels, and so forth.

The last thing I want to say is we have real problems and real challenges, although we are making progress, with respect to clean air, emission of sulfur oxide, nitrogen oxide, mercury, CO_2, and others. The good thing about nuclear—maybe the best thing about nu-

clear—is it is our biggest source of clean energy with none of those pollutants, including especially CO_2.

For all those reasons I think it is important that we find a way to strengthen the industry and a big part of that is making sure we have a strong NRC with great leadership at the top.

Thanks, Mr. Chairman.

Senator BARRASSO. Thank you very much.

I want to again welcome the witnesses and remind you that your full written testimony will be made a part of the official hearing today. I look forward to hearing your testimony beginning with Chairman Svinicki.

Please proceed.

STATEMENT OF KRISTINE SVINICKI, CHAIRMAN, U.S. NUCLEAR REGULATORY COMMISSION

Ms. SVINICKI. Thank you, and good morning, Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee.

My colleagues and I appreciate the opportunity to appear before you today to discuss the U.S. NRC's licensing and regulatory actions since our last appearance.

The Commission's continued efforts to improve the agency's efficiency and effectiveness have focused on providing the appropriate level of resources to both corporate and programmatic areas, while continuing to carry out our vital safety and security mission without diminishment.

In June 2014 the NRC established Project Aim to enhance the agency's ability to plan and execute its mission in a more efficient and effective manner. The agency continues to institutionalize the actions related to Project Aim and pursue additional activities that demonstrate the NRC's continuing commitment to effectiveness, agility, and efficiency.

Since the initiative began, we have endeavored to forecast our work with greater accuracy and identify changes to our resource needs in this dynamic nuclear environment. In light of the uncertainty in work forecasts, the agency is pursuing activities such as standardizing and centralizing support staff functions of both our headquarters and regional offices and institutionalizing a common prioritization process to prepare the agency to evaluate emerging work more readily and to staff it more efficiently.

We are also implementing an enhanced strategic work force planning process to improve the training, agility, and utilization of our very capable work force.

In a separate improvement initiative, the NRC has analyzed its fee setting process to improve transparency, equitability, and timeliness. To improve transparency, the agency has engaged with stakeholders over the past 2 years to better understand their interests associated with how information is presented on invoices.

Based on these engagements, the agency initiated several projects to improve how billable work is tracked and reported.

In our programmatic work, the NRC continues its pursuit of risk informed regulation through which we strive to put focus on those issues that are most important based on their safety significance.

Currently the NRC staff is evaluating and updating key risk informed, decisionmaking guidance, developing a graded approach for using risk information in licensing reviews, implementing training requirements for agency staff, enhancing communication of risk activities, and advancing other initiatives across the agency.

The NRC has also taken many steps over the last year to ensure uniform implementation of the agency's back fitting regulations which govern when the agency can impose additional requirements and are an essential part of the stability of our regulatory framework.

In support of this initiative, the staff is undertaking actions to improve oversight by NRC managers and lead to more consistent identification and treatment of potential back fitting issues.

The NRC also continues to evolve its licensing process for operating reactors. For example, the nuclear industry is researching advanced fuel designs aimed at improving safety margins under both normal and postulated accident conditions.

Several vendors are exploring candidate designs which they refer to as accident tolerant fuel. In response, the NRC is developing plans to ensure that we are prepared to effectively and efficiently review these fuels to ensure their proposed use meets our high safety standards.

The NRC has also received four letters of intent to seek subsequent license renewal which would authorize operation of commercial nuclear power reactors for up to 80 years. The NRC has been preparing for these reviews for several years and has published final versions of the documents that provide guidance for applicants and the NRC technical reviewers respectively.

Regarding NRC's activities associated with new reactors, although the licensees for V.C. Summer Units 2 and 3 decided to discontinue construction of those new units in South Carolina. The NRC's New Reactor Program continues its focus in support of the activities necessary to ensure the safe construction of the two AP1000 units under construction at the Vogtle site in Georgia.

The NRC is also finalizing and testing the regulatory procedures that will be necessary to assess the transition of these plants from the construction phase into their operating status.

We have also docketed the first application for a small modular reactor design and received an application from an early site permit for a small modular reactor in Tennessee. Both of these reviews are progressing on schedule.

We also continue our pre-application engagement with advanced reactor designers and vendors. Significant activity in the area of rulemaking is our rulemaking to improve the efficiency of the decommissioning transition process for operating reactors shutting down in the next few years.

We have published a regulatory basis for the development of the proposed rule and concluded there is sufficient basis to proceed with new and modified regulations addressing emergency preparedness, physical security, training, and financial requirements, among other areas.

We have received the request from the State of Wyoming to achieve agreement State status. We received that application package and are working to complete the assessment of that package.

It will be provided to the Commission. The staff targets doing that in September 2018. The State of Vermont has also indicated its intent to pursue agreement State status.

During this active hurricane season the NRC responded to Hurricanes Harvey, Irma, and Maria in accordance with our incident response plans. The NRC dispatched inspectors to the reactors impacted by the hurricanes to provide monitoring of the operators' event response. We worked closely with Federal partners such as FEMA.

We will also, consistent with our practice, evaluate both the agency and licensee responses to the hurricanes and implement any lessons learned to further improve our event response going forward.

In closing, the NRC continues to focus on efforts to achieve additional efficiencies without diminishment in our important public health and safety and security missions.

On behalf of the Commission, I thank you for this opportunity to appear before you. We will be pleased to answer your questions at the appropriate time.

Thank you.

[The prepared statement of Ms. Svinicki follows:]

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

UNITED STATES
NUCLEAR REGULATORY COMMISSION
Washington, DC 20555
www.nrc.gov

Kristine L. Svinicki

The Honorable Kristine L. Svinicki was designated Chairman of the U.S. Nuclear Regulatory Commission (NRC) by President Donald J. Trump on January 23, 2017. She was sworn in for her third term as a Commissioner to a term ending on June 30, 2022. Her previous terms as a Commissioner began on March 28, 2008, and July 1, 2012.

Chairman Svinicki has a distinguished career as a nuclear engineer and policy advisor, working at the state and federal levels of government, and in both the legislative and executive branches. Before joining the NRC, Svinicki spent over a decade as a staff member in the United States Senate advancing a wide range of policies and initiatives related to national security, science and technology, and energy and the environment. She also served as a professional staff member on the Senate Armed Services Committee where she was responsible for the Committee's portfolio of defense science and technology programs and policies, and for the atomic energy defense activities of the U.S. Department of Energy, including nuclear weapons, nuclear security, and environmental programs.

Previously, Svinicki worked as a nuclear engineer in the U.S. Department of Energy's Washington, D.C., Offices of Nuclear Energy, Science and Technology, and of Civilian Radioactive Waste Management, as well as its Idaho Operations Office, in Idaho Falls, Idaho. Before that, she was an energy engineer with the State of Wisconsin at the Wisconsin Public Service Commission in Madison, Wisconsin.

Born and raised in Michigan, Svinicki earned a bachelor's degree in nuclear engineering from the University of Michigan in 1988. She is a longstanding member of the American Nuclear Society and the Society has twice honored her with its Presidential Citation in recognition of her contributions to the nuclear energy policies of the United States. Chairman Svinicki was named Woman of the Year by the Women's Council on Energy and the Environment in 2013. She was selected as a Stennis Congressional Fellow of the 108th Congress, as a Brookings Institution Legis Congressional Fellow in 1997, and as the University of Michigan College of Engineering Alumni Society Merit Award recipient for Nuclear Engineering and Radiological Sciences in 2009.

June 2017

WRITTEN STATEMENT
BY KRISTINE L. SVINICKI, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
DECEMBER 13, 2017

Good afternoon, Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee. My colleagues and I appreciate the opportunity to appear before you today to discuss the U.S. Nuclear Regulatory Commission's (NRC) licensing and regulatory actions since our last appearance before this Committee in April of 2016. At that time, we committed to improving the agency's efficiency and effectiveness in both corporate and programmatic areas while ensuring the safety and security of regulatory activities. Today, I will focus on these ongoing efforts, as well as other significant licensing and regulatory activities.

The NRC is an independent Federal agency established to regulate commercial nuclear power plants; research, test, and training reactors; nuclear fuel cycle facilities; and radioactive materials used in medicine, academia, and for industrial purposes. The agency also regulates the transport, storage, and disposal of radioactive materials and waste and the export or import of radioactive materials. The NRC carries out its responsibilities in the United States and works with agencies around the world to enhance global nuclear safety and security.

The agency's statutory mission is to license and regulate the civilian use of radioactive materials in the United States, to ensure adequate protection of public health and safety, and to promote the common defense and security. The Commission's continued efforts to improve the agency's efficiency and effectiveness have focused on providing the appropriate level of resources to both corporate and programmatic areas and continuing to uphold our important safety and security mission. We continue to institutionalize the lessons learned from Project

Aim. We also have initiated other efforts including several related to the increased use of risk information in our regulatory activities and decision making.

The Commission appreciates the Committee's consistent support of the NRC's work to protect public health and safety. We have received the October 31, 2017, letter signed jointly by Chairman Barrasso and Senator Capito, addressing revisions to the agency's monthly report provided to this Committee. As requested in the letter, the reports for September and October 2017 continued to utilize the existing format and beginning with the report for the month of November 2017, we will start addressing the additional information requested.

NRC's Ongoing Focus on the Agency's Efficiency and Effectiveness

In June 2014, the NRC established Project Aim to enhance the agency's ability to plan and execute its mission in a more effective and efficient manner. Through Project Aim, the NRC has made significant strides, including approximately $48 million in reductions as a result of completing 148 of the 150 specific re-baselining activities approved by the Commission.

During 2017, Project Aim achieved another significant milestone by completing the major deliverables for each of the 19 discrete Project Aim tasks. These efforts addressed the NRC's need to improve efficiency and flexibility to right-size the agency, while retaining employees with the appropriate skills to accomplish its mission and streamline processes.

The agency continues to institutionalize the actions related to Project Aim, which will shape the NRC's organization going forward. The NRC also is pursuing additional activities such as standardizing and centralizing support staff functions of NRC headquarters and regional offices

and institutionalizing a common prioritization process to prepare the agency to evaluate emerging work more readily. We are also implementing an enhanced strategic workforce planning process to improve workforce management. These activities were not originally part of Project Aim, but demonstrate the NRC's continuing commitment to effectiveness, efficiency, and agility.

The agency has also undertaken organizational changes to make our efficiency improvements more durable. For example, we have established Centers of Expertise within the agency's organizational structure to increase our ability to respond quickly and effectively to current, emerging, and unanticipated work. In addition, the Commission approved staff recommendations to implement process enhancements and re-baselining initiatives for its materials programs.

The staff has also completed improvements to operating reactor licensing processes to enhance the predictability and efficiency of reviews while maintaining their effectiveness, quality, and focus on safety. Furthermore, while several offices have completed internal restructuring to become more efficient and effective, the Commission approved the reorganization plan and the business case for the proposed merger of the Office of Nuclear Reactor Regulation and the Office of New Reactors by September 30, 2020.

With the nuclear industry undergoing significant change, it remains a challenge to ensure the NRC is appropriately resourced to manage shifts in the nature of its existing and anticipated workload effectively. Since the Project Aim initiative began, we have endeavored to forecast our work with greater accuracy and identify changes to our budget needs in a dynamic regulatory environment. We are making progress in our ability to adapt our organizational

structure and workforce to the agency's current and projected workload. I would like to highlight two specific examples of strict position management actions we have taken to respond to changing workload requirements.

We recently implemented an organizational change in the Office of Nuclear Reactor Regulation to sunset the stand-alone organization formed in November 2011 to implement the agency's response to the Fukushima Dai-ichi Accident. The Japan Lessons-Learned Directorate, which led many of the regulatory initiatives to enhance the safety of commercial nuclear facilities in the United States following the accident in Japan, has been reconsolidated back into the Office's Division of Licensing Projects.

Also, we identified additional ways to reduce costs associated with the delivery of corporate support services and our FY 2018 budget request included a reduction of $3 million and 116 Full-time Equivalents. To reduce our corporate support staff size to match this decrease in workload and budget, we successfully used tools such as voluntary early retirement authority and voluntary separation incentive pay programs. Although these voluntary efforts to balance our workforce moved us significantly closer to achieve our human capital goals, we recognized that voluntary actions alone may not be adequate, and the NRC prepared for a reduction in force (RIF) to right-size our corporate resources. In September 2017, the agency issued RIF notices to a number of staff in the corporate support area and indicated that to the extent feasible, we would continue our efforts to place the impacted individuals into vacant positions within the agency that required additional resources to meet workload demands. As a result of these efforts, as well as the willingness of affected individuals to accept these new positions and take on new and different responsibilities, it will not be necessary to issue any involuntary separations.

The NRC developed a Strategic Workforce Plan that is focused on having the right people, with the right skills and competencies, at the right time and place to achieve the agency's health and safety mission. As part of our efforts to institutionalize Project Aim, we are continuing to refine this plan to ensure that NRC's workforce planning efforts are timely and responsive to changes in workload, while the agency retains and develops the skills needed to support our mission.

As another initiative, the NRC analyzed its fee-setting process to improve transparency, equitability, and timeliness of communications with our licensees and stakeholders. The NRC developed a comprehensive list of activities that include essential improvements to the agency's license-fee website, invoicing, and the Congressional Budget Justification (CBJ). The NRC implemented performance measures that it will use to gauge success in meeting the agency's goals of increased transparency, equitability, and timeliness, and the NRC will also monitor planned activities and compare results with established performance measures.

The performance measures for the transparency and equitability goals include the percentage of improvement activities completed each year (goal of 80%), conducting an annual public fee rule meeting with stakeholders, and holding two informal meetings with stakeholders. The measure for the timeliness goal will be the date that the proposed and final fee rules are published. Additional metrics will be considered for each goal as the agency gains experience with these enhancements.

The NRC also continues its progress in the area of fee-setting improvements. Activities including adding information to the CBJ to present the alignment of budget and fees, explaining our international activities in more detail, developing a new internal report to streamline the

development of the fee schedule, adding a section to the fee rule for a future class of licensees, and posting cost estimates for licensing and inspection actions on the agency's public website were all completed as planned in FY 2017.

To further improve transparency, the agency has engaged with stakeholders over the past few years to better understand their interests associated with how information is presented on invoices and reports. Based on these engagements, the agency initiated several projects to revise how billable work is tracked and reported. Starting next month, invoices will contain an additional level of detail that will improve transparency to the work being billed. The invoice will show each unique activity charge, and the name of a staff member or contractor who performed the work. The agency continues to work with stakeholders to identify and implement improvements to ensure transparency and accuracy of charges for the billable work.

The Commission has also taken steps to ensure Commission involvement early on in the rulemaking process, before significant resources are expended. To accomplish this, for those rulemaking activities that are not explicitly delegated to the staff, the staff now submits a rulemaking plan to the Commission for review and approval before the staff initiates activity on a rulemaking.

Each year the agency reviews ongoing and planned rulemaking activities to develop program budget estimates and to determine the relative priority of these rulemaking activities. As part of this review, the agency may identify rulemakings that may no longer be needed to meet our key strategic goals of safety and security. For example, in May 2016, the Commission approved discontinuing seven rulemaking activities and deferring two rulemakings that were in the early stages of development.

The discontinued rulemakings covered a variety of topics, and the basis to discontinue was different for each rulemaking. For example, one rule the Commission voted to discontinue was related to entombment, one of the decommissioning options available to commercial power reactors. Rather than conduct a separate rulemaking only for entombment, the Commission determined staff could address related issues in the broader Commission-directed rulemaking to make the power reactor decommissioning process more efficient, open, and predictable by reducing the reliance on licensing actions, including license amendments and exemptions, to achieve a long-term regulatory framework that defines the requirements and decommissioning options for reactors.

In March 2017, the NRC deployed a centralized tracking and reporting tool that provides real-time updates on all NRC rulemaking activities. Current rulemaking data is posted to the NRC website on our rulemaking pages.

In addition to these efforts, the NRC continues its pursuit of risk-informed regulation, through which we strive to put focus on those issues that are the most important based on their risk significance. The NRC has a long history of initiatives related to risk informing our regulatory framework including the development of agency-wide risk-informed and performance-based plans. As recently as May 2017, the Commission provided direction to the staff to increase the use of risk-informed decision making by identifying current challenges and strategies needed to overcome those challenges. This initiative has resulted in staff efforts to evaluate and update key risk-informed decision-making guidance, develop a graded approach for using risk information in licensing reviews, institute training requirements related to risk-informed decision-making for managers and staff, enhance communication on risk-informed activities, and

advance other risk-informed initiatives. Consistent with this history, the NRC will continue to look for ways to improve the use of risk information within our regulatory activities as we move forward.

In addition, the NRC has taken many steps over the last year to ensure uniform implementation of the agency's backfitting regulations, which govern when the agency can impose additional requirements and are an essential part of the NRC being a reliable regulator. Earlier this year, the NRC staff conducted a comprehensive review of the NRC's backfitting guidance, training, and knowledge management. In light of this review, the staff is undertaking 20 related actions, which are well underway, to improve oversight by NRC managers and lead to more consistent identification and treatment of potential backfitting issues. Of particular note is the current training initiative, which refreshes staff on both licensing-basis and backfitting concepts and reinforces the importance of following our processes with fidelity. All NRC staff with responsibilities involving backfit are expected to complete this training by the end of January. In addition, the Commission anticipates receiving the staff's updated backfitting guidance, which also reflects additional Commission direction on the compliance exception to the backfit rule, in April 2018, for review and approval.

I would now like to highlight a number of other noteworthy licensing and regulatory activities accomplished over the past year in the areas of Operating Reactors, New Reactors, and Nuclear Materials and Waste.

Operating Reactors

The NRC continues to refine its licensing process for operating reactors. Through the use of controls and metrics, we are currently meeting our congressionally reported metrics for the quantity of licensing actions reviewed annually, and the percentage of actions completed within one year.

In order to continue improving in this area, the NRC staff is developing enhanced guidance to improve the efficiency and consistency of reviews. We are also piloting a screening tool to better determine areas of focus in individual reviews, and conducting periodic audits of the Request for Additional Information (RAI) process. Our continual efforts in this area have significantly improved the NRC's ability to monitor work and improve predictability.

In cooperation with the Department of Energy (DOE), the nuclear industry is researching advanced fuel designs aimed at improving safety margins under both normal and postulated accident conditions, when compared to the fuel types that are in use today. Several vendors are exploring candidate designs, which are collectively referred to as Accident Tolerant Fuel, or ATF.

In response, the NRC is developing a detailed plan to ensure that we are prepared to effectively and efficiently review ATF designs and ensure that their proposed use meets our safety standards. The plan addresses a spectrum of ATF-related issues, including the design, testing, fabrication, shipping, operation, and storage of ATF. To support this work, we have identified infrastructure needs, including staff training and enhancements of computer codes. The draft

plan is scheduled to be available to the public later this month for comment. The staff intends to finalize the plan by April 2018.

The NRC staff has had extensive engagement with DOE, and other stakeholders, in preparing the ATF project plan. The interaction with DOE allows NRC to explore opportunities to leverage experimental and computational work already conducted by DOE. We have also engaged international organizations. For example, the NRC staff recently met with representatives from the Organisation for Economic Cooperation and Development's Nuclear Energy Agency to understand how the international community is considering innovations such as ATF.

The NRC has recently received four letters of intent to seek subsequent license renewal, which would authorize operation of a commercial power reactor for up to 80 years. The NRC has been preparing for these reviews for several years and has published final versions of the "Generic Aging Lessons Learned for Subsequent License Renewal" and the "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants." These documents provide guidance for applicants and NRC technical reviewers respectively. The guidance was developed with the benefit of experiences from the first round of license renewal applications.

The NRC responded to Hurricanes Harvey, Irma, and Maria in accordance with our Incident Response Plans. Specifically, the NRC dispatched inspectors to the facilities impacted by the hurricanes to provide around-the-clock onsite monitoring of our licensees' responses. The NRC also staffed its Incident Response Centers in the affected Regional Offices to monitor the storms and their effects. The NRC dispatched Regional State Liaison officers to affected states to support the response to the hurricane's impact on NRC-licensed facilities. The NRC worked

closely with its Federal partners, including the Federal Emergency Management Agency (FEMA), and provided updates to the U.S. interagency response. While some licensees suspended facility operations as a result of the storm impacts, none experienced safety or security events.

At the conclusion of any event, the NRC evaluates potential lessons learned that could improve the NRC's future performance. In this instance, the response to the recent hurricanes identified potential improvements related to determining the condition of offsite response capabilities. In addition, the NRC, FEMA, and the nuclear industry are working to identify how communications during and after hurricane events may be further enhanced.

New Reactors

The NRC's new reactor program includes the regulatory activities associated with siting, licensing, and overseeing construction of new nuclear power reactors as well as addressing policy issues associated with small modular reactors and non-light water reactors (non-LWR).

On July 31, 2017, South Carolina Electric and Gas Co. and Santee Cooper, the licensees for V.C. Summer Units 2 and 3, announced their decision to discontinue construction on Units 2 and 3, and asked the NRC to discontinue our licensing and construction oversight work. With the discontinuation of the V.C. Summer project, the NRC's new reactor program continues its diligent work to support the activities necessary to ensure the safe construction and operational readiness of the two AP1000 units under construction at the Vogtle site in Georgia, the first of which currently plans to begin loading fuel in 2020. These activities include reviewing license amendments, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) closure

notifications, performing construction inspections and inspections of the initial test programs, and preparing for the eventual transition of the plants to the operational phase.

Through the consistent application of lessons-learned, the NRC has been timely in its review of license amendment requests. To achieve this, the NRC has developed new internal metrics to better track the timeliness related to the review of license amendment requests supporting Vogtle licensing efforts, and initiated quarterly management meetings with the licensee to align on expectations and priorities.

The NRC has also implemented enhancements to our operator licensing program and made improvements to the ITAAC closure notifications process in anticipation of the surge in ITAAC closure notifications near the end of construction. The NRC is preparing the regulatory procedures necessary to transition the plants from the construction phase into operating status. To do so, the NRC developed an integrated plan that identified all regulatory functions necessary to support the transition. In November, the NRC issued an implementation plan clarifying responsibilities and establishing the process to complete the transfer of regulatory oversight and licensing for the AP1000 design center. To date, 10 of the 29 recommendations are complete, and another 16 will be completed in fiscal year 2018.

Over the past year, the NRC also completed several milestones in its ongoing large, light water reactor design reviews, including completing the technical reviews for all of the active combined license applications. Yesterday, the Commission held a hearing for the last active combined license application, for the potential construction of two AP1000 units at the Turkey Point site in Florida.

In March of this year, the NRC docketed the first application for a small modular reactor (SMR) design certification submitted by NuScale Power. The staff's strategy for completing this review within the projected 42 months relies on the use of technical audits early in the review schedule, alignment of the request for additional information process with the required regulatory findings, and resolution of challenging technical and regulatory issues as soon as they are identified. To date, the staff has identified nearly two dozen significant technical issues that are unique to the NuScale SMR design, and the staff has developed a review plan for each of these issues. At this time, the overall regulatory review is progressing on the established schedule.

In May of 2016, the NRC received an application from the Tennessee Valley Authority (TVA) for an early site permit for small modular reactors at the Clinch River Nuclear Site in Tennessee. The staff's environmental and technical review is progressing on schedule. We have been notified that we may receive additional applications from TVA and Utah Associated Municipal Power Systems for combined licenses in the next few years.

With respect to advanced reactor designs, the NRC staff has developed a multi-part strategy to prepare for the review of non-LWR technologies. In December of last year, the agency staff issued its strategy, entitled, "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness." The strategy has three objectives: enhancing technical readiness; optimizing regulatory readiness; and optimizing communication. To achieve these objectives, the NRC staff has identified specific activities that it will conduct in the near-term (within five years), mid-term (five to-10 years), and long-term (beyond 10 years) timeframes and has made significant progress in activities related to all of the near-term strategies. These efforts are being performed with regular engagement with DOE and external stakeholders. The NRC has made progress to prepare for potential near-term applications.

Based on stakeholder feedback, the agency has put a priority on advancing risk-informed and performance-based approaches and resolving key policy issues.

A total of five non-LWR developers have expressed their intent to start regulatory interactions with the NRC, and the staff started formal pre-application interactions with Oklo, Inc. in November 2016 regarding its compact fast reactor design. The staff is implementing a flexible and staged regulatory review process to engage with Oklo to align the NRC's activities with the developer's pace of activity. In addition, the agency is implementing transformational change by using a "small core team" to support cost-effective non-LWR reviews. The core review team concept provides stability and consistency to the developer while ensuring efficient and agile use of available NRC resources. The agency anticipates starting additional pre-application reviews in fiscal year 2018 and 2019, and beginning one or more advanced reactor application reviews in the next two to four years.

Nuclear Materials and Waste Safety

The Commission continues to provide monthly updates to Congress on its efforts to address the decision issued by the U.S. Court of Appeals for the District of Columbia Circuit in *In re Aiken County*, focusing on our efforts to most effectively spend the limited remaining available Nuclear Waste Funds to continue with the licensing process for Yucca Mountain. As reflected in agency monthly reports, the Commission previously directed the staff to complete its safety evaluation report, develop a supplemental environmental impact statement, and make documents related to the licensing proceeding publicly available. Upon completion of these activities, the Commission directed agency staff to hold a virtual meeting of the Licensing Support Network (LSN) Advisory Review Panel to provide information to, and gather input from, advisory panel

members and the public regarding possible reconstitution of the LSN or a suitable replacement system. The Commission also approved gathering preliminary information regarding potential adjudicatory hearing venues.

In 2014, the Commission directed the staff to proceed with an integrated rulemaking on power reactor decommissioning to improve the efficiency of the decommissioning transition process and to address other key issues. This rulemaking will account for the reduction in radiological risk for plants transitioning from operating to decommissioning and will reduce the need for exemption and license amendment requests by licensees in the process of decommissioning. The staff issued an Advance Notice of Proposed Rulemaking and a draft regulatory basis for public comment in November 2015 and March 2017, respectively. The staff considered the comments submitted on both documents in finalizing the regulatory basis that the staff published in November 2017.

In the regulatory basis, the staff concluded that there is sufficient justification to proceed with new regulations in several areas, including emergency preparedness, physical security, cyber security, drug and alcohol testing, training requirements for certified fuel handlers, decommissioning trust funds, financial protection requirements and indemnity agreements, and application of the backfit rule. The staff recommended addressing other topics, such as the role of state and local governments in the decommissioning process and aging management, via updated guidance or inspection procedures in lieu of rulemaking.

The staff plans to provide the draft proposed rule to the Commission in the spring of 2018. After incorporating Commission direction, the staff plans to issue the proposed rule and draft implementation guidance for a 75-day public comment period. The staff's goal is to submit the

draft final rule to the Commission in the fall of 2019. Concurrent with the rulemaking process, the staff continues to conduct timely reviews of decommissioning exemption and amendment requests for those sites currently undergoing decommissioning.

There are currently 37 Agreement States that have entered into formal agreements with the NRC, pursuant to Section 274 of the Atomic Energy Act of 1954, as amended (AEA), to regulate certain quantities of AEA material at facilities located within their borders. Over the last several years, the NRC has been in discussions with the State of Wyoming to become the next Agreement State and more recently the State of Vermont has expressed interest in becoming an Agreement State. On October 4, 2017, the Commission approved the State of Wyoming's proposed approach for a limited Section 274b. agreement for source material involved in the extraction or concentration of uranium or thorium milling, and the management and disposal of byproduct material. On November 14, 2017, NRC staff received the State of Wyoming's final application for the limited Section 274b. agreement and is working to complete its assessment.

In March of 2017, the NRC's Executive Director for Operations testified before this Committee that the Commission was in the process of analyzing the possibility of changing the current 10-year duration of uranium recovery licenses to a longer term, such as 20 years. Subsequently, on November 9, 2017, the Commission approved the staff's recommendation to implement a maximum license term of 20 years for new applications and license renewals for uranium recovery facilities. The staff based its recommendation on the relatively low level of risk involved in the current operations of these facilities, and their historical performance, and concluded that issuing license terms for a maximum of 20 years will not adversely impact the protection of public health and safety.

Closing

In closing, the NRC continues to focus on efforts to achieve additional efficiencies without diminishment of its public health and safety, and security missions. Chairman Barrasso, Ranking Member Carper, and distinguished Members of the Committee, this concludes my written testimony. On behalf of the Commission, I thank you for the opportunity to appear before you. Thank you also for your support of the vital mission of the NRC. I would be pleased to respond to your questions. Thank you.

Senate Committee on Environment and Public Works
Hearing entitled "Oversight of the Nuclear Regulatory Commission"
December 13, 2017
Questions for the Record

Chairman John Barrasso
(Questions for Chairman Svinicki)

QUESTION 1. **In your testimony, you mentioned the NRC's "strategic workforce planning" efforts. What actions will the NRC take to improve leadership development among agency staff and ensure that these efforts focus on finding, cultivating, and advancing the most capable leaders?**

ANSWER.

The NRC's leadership development programs have consistently emphasized the importance of leadership at all levels within the organization. Specifically, the NRC's *Leaders' Academy* provides current and future agency leaders with training and development opportunities for the full spectrum of leadership competencies outlined by the Office of Personnel Management. The programs that comprise the *Leaders' Academy* are focused on transforming NRC's approach to talent management and leadership development. The NRC actively promotes and provides all employees with the requisite skills, and developmental opportunities needed to cultivate leadership traits at every level of the organization.

The programs that comprise the Leaders' Academy provide comprehensive, integrated training and development programs, and development becomes more individualized as staff serve in progressively more responsible positions. For newer employees (Grades 7-12) the NRC offers the *Leadership At All Levels* Certificate Program, which empowers staff to demonstrate leadership traits and apply their knowledge as leaders in their current work environment. For mid-career employees (Grades 13-15) who are interested in moving into supervisory positions, the *Aspiring Leaders* certificate program introduces supervisory concepts and helps individuals

discover if supervision is the next step in their career path. The final step is the competitively advertised Senior Executive Service (SES) Candidate Development Program, which has been certified by the Office of Personnel Management. Along the way, all NRC supervisors and managers participate in an OPM administered 360 Assessment for leadership growth and development.

The NRC's senior leadership annually assesses and reviews the capabilities and developmental needs of each executive to ensure executive staff are prepared to fulfill agency leadership needs. Recommendations include specific developmental opportunities such as mentoring, coaching, other learning, and/or readiness for reassignment to positions with different or more challenging responsibilities.

QUESTION 2. **On October 25, 2017, the NRC submitted a report on the progress made on licensing applications to Senate appropriators. The report states that: "The NRC staff recently finalized an internal self-assessment that identifies possible efficiency improvements within the Uranium Recovery Program." Please describe, in detail, these efficiency improvements and NRC's timeframe for implementing them.**

ANSWER.

In 2017, the NRC completed a review of efficiency and effectiveness opportunities for the uranium recovery licensing review process that identified several recommendations. The staff developed a project plan to implement these actions in the near-term (within 12 months), mid-term (within 18 months), and long-term (greater than 18 months).

Near-Term

- Recommendation: Continue pre-application activities for major licensing actions, institutionalize the practice into internal procedures, and encourage applicants to support pre-application activities.

  Status: The NRC staff continues to encourage pre-application activities for major licensing actions and is drafting a procedure that outlines roles and responsibilities for NRC staff and the applicant, when to engage with the applicant, the scope of pre-application activities, deliverables, and desired outcomes. The staff expects to complete this procedure by September 2018.

- Recommendation: Develop and implement improved planning and scheduling processes. Develop internal schedules that take into account resource constraints, project complexities, and identify critical path items. The internal schedules should contain enough detail to allow the staff to identify critical path items so that risk mitigation plans can be developed.

  Status: The NRC staff has developed detailed project plans for each major licensing action that incorporate the recommended elements. NRC management has begun holding periodic meetings to discuss status and schedule risks for open major licensing actions, develop mitigation measures for schedule risks, and monitor licensee performance. In addition, the NRC staff has developed work breakdown structure and schedule templates for expansion reviews and financial surety reviews. The templates are being piloted for one expansion review. Staff plans to review the implementation of the pilot and use lessons-learned to develop additional schedule templates in fiscal year 2019. Finally, the staff is now issuing schedule letters that include major milestones and discuss the set of assumptions that were used for the

development of the schedule, as well as key expectations that would need to be satisfied to meet the established schedule.

- Recommendation: Develop and adopt requests-for-additional-information (RAI) development guidance to ensure that questions provide a clear nexus to regulatory requirements. In addition, issue RAIs as soon as they are identified with due consideration to interrelationships within the review areas. Continue calls with applicants to clarify RAIs and responses.

  Status: The staff reviewed guidance documents from the Office of Nuclear Reactor Regulation, the Office of New Reactors, and other divisions within NMSS to identify best practices. In addition the staff performed a survey of uranium recovery staff to elicit ideas for further improvements to the licensing process. Based on these activities, the staff is updating the existing RAI guidance and is implementing that process. The staff expects to complete the update by September 2018.

Mid-Term

- Recommendation: Develop a specific acceptance review guidance document.

  Status: The staff reviewed guidance documents from the Office of Nuclear Reactor Regulation, the Office of New Reactors, and other divisions within NMSS to identify best practices. In addition the staff performed a survey of uranium recovery staff to elicit ideas for further improvements to the process. Based on these activities, the staff is drafting guidance for performing acceptance reviews. The staff expects to complete this guidance by March 2019.

- Recommendation: Develop a priority system for new licensing action requests.

  Status: This action is ongoing. The staff currently prioritizes the work based on its significance. The first priority is licensing and oversight activities for uranium recovery facilities in operation. This includes reviews of amendments and renewals, and oversight through inspections. The second priority is reviewing licensing

applications for new facilities and expansions of existing facilities. The third priority is supporting rulemaking and guidance updates related to the uranium recovery program. This recommendation relates to developing a prioritization scheme for licensing actions within the first two priorities. The staff is reviewing prioritization schemes used in the Office of Nuclear Reactor Regulation, the Office of New Reactors, and other divisions within NMSS to identify best practices. The staff expects to finalize the prioritization scheme by March 2019.

- Recommendation: Develop a draft safety evaluation report as RAIs are prepared. Each RAI should correlate to a specific information gap in the draft safety evaluation report that the licensee response is expected to fill.

  Status: The staff is currently implementing this recommendation.

- Recommendation: Continue to explore potential opportunities for improving documentation of the environmental conclusions in the staff's National Environmental Policy Act (NEPA) documents.

  Status: This activity is ongoing. The NRC staff continues to look for potential opportunities to enhance its NEPA environmental review process. Consistent with the Memorandum of Understanding (MOU) between the NRC and the U.S. Bureau of Land Management (BLM), the NRC staff continues its coordination of NEPA and National Historic Preservation Act (NHPA) Section 106 reviews related to facilities that require an NRC license to possess and use source and byproduct materials, and are located on public lands under BLM's regulatory authority. The goal of the MOU is to limit, to the extent possible, duplication of consultation, review, and evaluation efforts on a project. This approach is currently being applied to the review of an application for the expansion of a uranium recovery facility.

- Recommendation: Continue to explore opportunities to improve the consultation process under Section 106 of the National Historic Preservation Act.

Status: This activity is ongoing. For efficiency, the NRC conducts the Section 106 process in coordination with the NEPA review process. To the extent possible, the NRC's completion date for its NHPA Section 106 review for a specific licensing action aligns with the date for publishing the final NEPA environmental review document. This approach was applied to the recent review of license applications for two uranium recovery facilities. In addition, the NRC continues to work through its interagency agreement with the Advisory Council on Historic Preservation to receive technical assistance on Section 106 reviews. Finally, to further improve the agency's NHPA and NEPA processes for licensing activities, the NRC has updated several documents regarding tribal consultation. The NRC published the final Tribal Policy Statement on January 9, 2017 (82 FR 2402), and revised its Tribal Protocol Manual (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17193A424), which will improve the effectiveness of consultations and interactions between the NRC and Tribes.

Long-Term

- Recommendation: Pursue rulemaking to develop regulations that are specific to in situ recovery facilities. Update review guidance documents consistent with the final rule.

  Status: The implementation of this recommendation depends on the issuance of the proposed revision to Part 192 of Title 40 of the Code of Federal Regulations (40 CFR 192), "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings."

QUESTION 3. **The NRC is implementing a pilot program to establish a flat fee structure for routine uranium recovery licensing actions. It's my understanding that the NRC plans to take up to four years to implement this pilot program. If the NRC only gathers data for the**

next few years, that data will represent only a limited number of lengthy licensing reviews. Such an approach will ignore NRC's past licensing reviews, which may have been more efficient, and consequently skew the data toward higher flat fees. How will the NRC account for such a bias?

ANSWER.

The NRC recognizes that the resources needed to complete complex licensing reviews may vary significantly based on the nature of the request. As described in the staff paper SECY-16-0097, "Fee Setting Improvements and Fiscal Year 2017 Proposed Fee Rule," the staff is exploring the use of flat fees for specific types of routine license amendment reviews that by their nature have less variability in the resources needed for their completion. The schedule for implementing flat fees in fiscal year 2020 was designed to provide sufficient time to develop a voluntary pilot initiative and collect data for consistent and repeatable licensing actions to support implementing flat fees. Data associated with past licensing reviews such as the NRC staff time spent on specific licensing actions was not always recorded and aggregated in a manner that would lend itself to automated analysis in support of this effort. Therefore the NRC deployed the new data recording structure and trained staff on recording their time using the new structure. After a year of recording data using the new data structure, the staff will begin analysis of the data, identify any outliers that may be skewing the data, and evaluate if an equitable flat fee structure can be established. This analysis will be qualitatively informed by staff experience with past licensing reviews. The staff will then develop recommendations and seek volunteers among the licensees to participate in the pilot. The NRC staff will use the results of this pilot to further refine the flat fee structure and address any identified unintended bias. The schedule we have planned for this initiative will support thoughtful interaction with the licensee community. As part of this initiative, staff will also reach out to the Agreement States to understand their fee setting methodologies and adopt any insights gained, as appropriate, given

the differences in legal and fee recovery requirements. Once the appropriate flat fees have been implemented, they will be reevaluated on a regular basis as new data is recorded to ensure that the flat fees reflect the true cost of the services that the licensees receive.

QUESTION 4. **The NRC is currently reviewing applications for ten-year license renewals for two uranium recovery facilities. How much additional time would be necessary for the NRC to complete its review if the applicants revise their application to include a twenty-year license renewal?**

ANSWER.

The NRC is reviewing two uranium recovery facility license renewal applications. The NRC staff has contacted both applicants to determine their interest in pursuing a 20 year license. One applicant has decided not to pursue a 20 year license. As of January 2018, the other applicant had not yet decided whether to pursue a 20 year license. Should this applicant decide to pursue a 20 year license, it would need to send a letter to the NRC requesting a 20 year license term. The NRC staff would then re-notice the opportunity for a hearing, which would be limited to issues that may arise as a result of operating for 10 additional years. The NRC would need to evaluate whether there would be any changes in the safety findings or environmental impacts resulting from an additional 10 years of operation. The amount of additional time needed for the NRC staff to complete its review would depend on the nature and extent of those changes.

QUESTION 5. **Your testimony touts "process enhancements," "efficiency improvements," "internal restructuring," and "rebaselining" taking place at the agency. Please describe what you expect to achieve in terms of specific time or cost savings. How will the NRC measure the results of these changes to verify improvement in the agency's overall performance?**

ANSWER.

As a result of Project Aim and continuing efforts to improve the agency's efficiency, the NRC has reduced expenditures by tens of millions of dollars and decreased our workforce by hundreds of FTE. Some cost reductions from the process enhancements, efficiency improvements, internal restructuring, and rebaselining are already reflected in the agency's budget. For example, the FY 2017 enacted budget and FY 2018 budget request included combined reductions of $48 million, including 185 FTE as a result of the rebaselining initiative that was completed as part of Project Aim. The FY 2018 budget also included a 73 FTE reduction as a result of a review of the corporate offices' FTE utilization and workload to identify efficiencies.

Some examples of the current initiatives include: 1) standardization and centralization of support staff functions in NRC headquarters and regional offices; 2) development of an agency-level Idea Greenhouse program and Innovation forum; 3) implementation of an enhanced strategic workforce planning process that will improve workforce management by focusing on strategic human capital management and longer-term planning; and 4) merger of the Office of Nuclear Reactor Regulation and the Office of New Reactors. Future budget requests will reflect future resource reductions as appropriate.

The NRC measures the results of these changes primarily through the performance indicators reported to Congress in the Congressional Budget Justification and the Quarterly Performance Review. . The Quarterly Performance Review focuses on the many lower level measures the agency tracks to ensure that resource reductions will not adversely affect its overall performance, and identifies risk areas where additional management focus is needed.

QUESTION 6. **In 2016, the NRC solicited feedback from stakeholders on its fees in the Federal Register. I understand that the NRC staff used the**

feedback to improve NRC's invoices. What specific changes did the NRC implement and how do these changes address stakeholders' concerns?

ANSWER.

The NRC is on target to complete the following fee invoice changes to improve transparency starting with the invoices that will be billed by the end of January 2018:

- A new data element, the Enterprise Project Identifier (EPID), will be added to the invoice. The EPID is an umbrella code for each licensing action, inspection report or project. The invoice charges will be grouped by EPID, and for each EPID a further itemized breakdown of charges by Cost Activity Code (CAC) will be provided. The EPID provides additional descriptive information on the invoice and allows the grouping of costs for a single project so that costs for multiple projects are no longer commingled within the invoice. A total of all charges associated with the EPID for the billing period will be provided on the invoice as well. The new Project-Activity structure (EPID-CAC) will now be consistent for all types of billable work, (licensing, inspections, or projects).
- Invoices will include standard CAC titles rather than codes that are licensing action or inspection specific, and tied to a specific docket. In addition, the creation of CACs has been centralized within the NRC so that controls are in place to ensure the quality of the CAC description. The standardization and centralization of CACs provides consistent descriptions for the same type of work activity performed for all EPIDs (licensing action, inspection, or project).
- NRC staff names and contractor company names will be added to the invoice for each itemized CAC allowing a licensee to see who performed the work being invoiced.

QUESTION 7. **In 2016, the Commission instructed NRC staff to accelerate the agency's transition to an electronic billing system. What steps has**

the NRC staff taken to implement electronic billing and when will the NRC fully implement electronic billing?

ANSWER.

The NRC is currently in the planning phase of the electronic invoicing (eBilling) project. The following Near-Term and Medium-Term tasks are in progress or planned for the remainder of FY 2018 with a phased implementation targeted for the beginning of FY 2020:

Near-Term (3 to 6 months):

- Document the current "as-is" fee billing processes – In progress
- Document the current fee billing information technology systems – In progress
- Continue to perform requirements analysis on items that may impact the fee billing process and systems – In progress
- Interview other Federal agencies that recently implemented electronic invoicing for lessons learned opportunities – In progress
- Select an eBilling tool.

Medium-Term (6 to 12 months):

- Establish the initial eBilling solution based on the eBilling tool, outreach activities, lesson learned opportunities, and requirement analysis.
- Reach out to the Nuclear Energy Institute (NEI) and licensees' billing staff for initial eBilling proposed solution, input/awareness, and identification of customers to participate in phased- approach implementation.
- Develop a phased approach and corresponding project plan to implement the eBilling solution based on stakeholder feedback.

Long-Term (Greater than 12 months):

- Execution phase of the eBilling solution, with the initial phased approach deployment occurring on or about October 2019.

- Continue with the phased implementation of e-billing to all licensees with a targeted completion by the end of FY 2020.
- Continue to perform outreach activities with NEI, licensees' billing staff, and other stakeholders.

QUESTION 8. **With all these improvements to invoices, how will the NRC know if the changes are helpful? Is the NRC planning to solicit feedback from licensees on the changes? If so, how and when?**

ANSWER.

The NRC is planning to solicit feedback on the changes to the invoice via teleconference with NEI and a representative sample of licensees in the early spring after the January 2018 invoices are received by our licensees. The OCFO is targeting the March/April 2018 timeframe, which will allow sufficient time for licensees to receive and review their first redesigned invoice.

QUESTION 9. **The NRC staff has proposed revisions to 10 CFR Part 61 regarding radioactive waste disposal, including commercial disposal of depleted uranium. How does the NRC plan to ensure that the costs to affected fuel cycle parties (e.g., waste generators) are commensurate with the enhanced safety achieved under the proposed revisions to 10 CFR Part 61?**

a. Please describe NRC's plans to assess the costs of the safety enhancements and to verify that the safety enhancements are cost-justified.

b. How will the NRC verify that the safety enhancements were successful?

ANSWER.

a) The NRC applies its principles of good regulation to ensure that new requirements are not imposed without considering the cost and benefits of the new requirements as they relate to

public health and safety. During the development of any rulemaking, the NRC prepares a regulatory analysis to evaluate the costs and benefits of the rule. The NRC uses the standardized methods presented in NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," in preparing its regulatory analysis. To the extent possible, these evaluations use quantitative data relevant to the cost and benefits of the rule. The NRC will prepare a revised regulatory analysis for the proposed revisions to 10 CFR Part 61.

At the direction of the Commission, in order to better refine potential costs and benefits related to the 10 CFR Part 61 rulemaking, the NRC issued a *Federal Register* notice (82 FR 48283) on October 17, 2017, for 30 days (and subsequently reopened for another comment period at the request of commenters) requesting specific cost and benefit information to better inform the updated draft regulatory analysis. The NRC staff also held a public meeting on the same subject on October 19, 2017. In light of concerns that industry practices obscure the true costs of the rulemaking, the NRC specifically asked stakeholders to provide information on "[w]hat are the potential transfer ('pass-through') costs to the waste generators and processors?" The NRC staff will use the information submitted by stakeholders to update the draft regulatory analysis. Additionally, based on Commission direction, the NRC staff plans to publish a supplemental proposed rule for the 10 CFR Part 61 rulemaking this summer, which will include an opportunity for stakeholders to provide additional comment on the updated draft regulatory analysis. All comments will be considered by the NRC prior to publication of any final rule.

b) The proposed 10 CFR Part 61 rulemaking would require licensees to evaluate the disposal of its wastes, including depleted uranium, on a site-specific basis by using realistic assumptions and to show that the performance requirements would be met for a minimum of 1,000 years to better ensure that the potential impact from the disposal of its wastes are protective of current and future populations. The regulator, either the NRC or an Agreement State, will review the licensee-developed performance assessment, the associated state of the art analysis, and will

conduct its own confirmatory analyses to verify that disposal is protective of the public health and safety. While the sites remain licensed, the regulator will inspect the site periodically to ensure that the licensee is compliant with the regulations, license conditions, and orders. In addition, for those sites located in Agreement States, the NRC will periodically evaluate the adequacy of an Agreement State's regulatory programs through an Integrated Materials Performance Evaluation Program (IMPEP) review to ensure that those programs are compatible with NRC regulations, as appropriate.

The Honorable Cory Booker
(Questions for Chairman Svinicki and Commissioners Baran and Burns)

QUESTION 10. **The nuclear industry is faced with increased numbers of premature plant closures at the same time that interest in advanced and small modular reactor designs have attracted significant attention and investment. With the NRC fee base changing, how do you see these trends impacting NRC staffing levels in coming years - where do you see potential cuts in personnel and offices and where do you see potential increases in personnel and offices?**

ANSWER.

The NRC remains committed to using its resources effectively and efficiently to accomplish the agency's primary mission to license and regulate the Nation's civilian use of radioactive materials to protect public health and safety and promote the common defense and security.

The NRC continues to be responsive to a dynamic external environment that may include new technical issues, new industry-changing technologies, or changes in the regulated community (such as merchant plants moving toward decommissioning). The NRC has integrated human capital planning with broader agency operational strategies to more efficiently align workload, skills, people needs, and organizational structure to meet both short- and long-terms objectives. The NRC's enhanced strategic workforce planning process is implemented annually and ensures the insights from both a one-year and five-year workload forecast are considered in NRC's strategic planning, human capital management, and budget formulation activities. NRC anticipates additional benefits from the strategic workforce planning process that include increasing the range of skills and abilities of our people, while creating a more agile talent pool that will allow us to respond more quickly to unplanned changes in workload.

The NRC remains committed to ensuring that funded positions match the agency's expected workload. For example, in 2016 the Commission approved a merger between the Office of New Reactors and the Office of Nuclear Reactor Regulation to reflect the expected decrease in new reactor licensing activity. Specifics about future year workload and budget increases or decreases are considered pre-decisional per OMB Circular A-11, Section 22.

QUESTION 11. **The NRC has stated that it is prepared to review an advanced reactor design today, but that it just won't be an efficient review. When will the NRC be prepared to offer an efficient review of an advanced reactor design, and what outside resources or input does the NRC need to get to that point?**

ANSWER.

The NRC staff has developed a vision and strategy to ensure that the agency is ready to review potential applications for non-light water reactor (non-LWR) technologies effectively and efficiently. The staff described the vision and strategy in "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," which was issued in December 2016. As stated in the vision and strategy document, the NRC has aligned its readiness activities to support the Department of Energy's (DOE's) identified deployment goal of having at least two non-LWR designs reviewed by the NRC and ready for construction by the early 2030s. To keep pace with DOE's stated goals, the NRC plans to achieve its strategic goal of readiness to effectively and efficiently review and regulate non-LWRs by no later than 2025. In 2016, the NRC began executing its vision and strategy for licensing non-LWRs and has mapped out activities to achieve readiness by 2025. The NRC recognizes that non-LWR vendors may wish to commence pre-application activities or submit applications for review in the near-term, in advance of DOE's deployment goal. In those cases, the NRC will

work with vendors on design-specific regulatory engagement plans and accelerate specific readiness activities, as needed.

To achieve the goals and objectives stated in the NRC's vision and strategy, the NRC staff has developed implementation action plans (IAPs). The IAPs identify the specific activities the NRC will conduct in the near-term (within 5 years), mid-term (5-10 years), and long-term (beyond 10 years) timeframes. The staff issued the near-term, mid-term and long-term IAPs on July 12, 2017. To complete all of the activities described in the near-term IAPs, the staff estimated needing an average of about $10 million per year. A better understanding of the priorities among the various non-LWR technologies being pursued would facilitate prioritization of readiness activities and resource planning. The NRC needs input from prospective applicants regarding their plans for regulatory engagement and the anticipated schedule for application submittals.

QUESTION 12. **We are heading into an era of older and older reactors, which will have more technical and maintenance issues – and while these reactors can be safely operated, they will have different needs. Do you anticipate needing to change NRC inspection schedules, or the types of inspections being conducted, based on an aging fleet?**

ANSWER.

The license renewal process is well established and has resulted in the issuance of a number of renewed operating licenses since 2000. Since 2009, plants have begun to enter and operate in the period of extended operation, which is the 20-year period commencing immediately after the completion of an applicant's initial 40-year operating license period.

In this regard, the license renewal review verifies that applicants have identified the appropriate systems, structures and components that require aging management. Applicants also propose the appropriate programs and activities that will adequately manage these aging effects, and

incorporate these proposed programs and activities as their new licensing basis for the post-license renewal period. Thus, when the NRC issues a renewed operating license, the existing oversight process will monitor and assess licensee processes and activities to manage age-related degradation.

The NRC staff has continuously integrated aging management guidance and inspections into the existing baseline inspection program. An example of this is the inspection to evaluate plant specific aging management issues at an individual plant 5 to 10 years into the period of extending operations, which is part of Inspection Procedure 71003, "Post-Approval Site Inspection for License Renewal.

Additionally, the reactor oversight process is continuously evaluated through feedback forms and assessments to identify any generic changes that are necessary due to aging management issues identified from operating experience.

QUESTION 13: **Do you believe that NRC has an appropriate framework in place for the licensing of a waste repository – whether permanent such as Yucca Mountain, or an interim storage facility – or do you need to modify existing regulations or add additional personnel in order for NRC to license a waste repository?**

ANSWER.

The NRC has an appropriate regulatory framework in place for the licensing of storage and disposal of high-level radioactive wastes (HLW) consistent with the Nuclear Waste Policy Act of 1982, as amended. In particular, the NRC regulates storage of HLW under 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," and disposal at Yucca Mountain under 10 CFR Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada."

Regarding the licensing framework for disposal at a site other than Yucca Mountain, updates to 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," (NRC's generic regulations for disposal of HLW for sites other than Yucca Mountain) would be needed to reflect the Environmental Protection Agency's current generic standards for HLW disposal and consider risk-informed, performance-based approaches for geological disposal developed after Part 60 was finalized.

Pending congressional funding and Commission direction to resume Yucca Mountain activities, the NRC staff plans to evaluate the possibility of re-assigning existing technical staff from within the agency and address any gaps in technical disciplines through existing contract mechanisms, temporarily utilizing re-hired annuitants, or through limited term appointments. The NRC does not currently expect to have staffing needs that would delay the restart of this proceeding.

The Honorable John Boozman
(Questions for Chairman Svinicki and Commissioners Baran and Burns)

QUESTION 14. **UPS tracks nearly 16 million packages a day. FedEx handles about 9 million per day. The NRC expects to review 700 licensing actions for operating reactors in FY 2018. Licensees often complain that there is no transparency into the status of these reviews.**
a) What is the NRC doing to institute some version of "real-time tracking" to create more transparency into the progress of these reviews?

ANSWER.

The NRC staff and licensees/applicants have routine communications regarding the status and schedules of licensing reviews. During these conversations, the schedules for each licensing review are discussed, including consideration of whether the licensee's desired review schedule can be achieved, when to expect requests for additional information, and when to expect the safety evaluation, if approved. In addition, the staff is accessible to the licensees/applicants by phone or e-mail if any other issues arise.

The NRC continues to refine its licensing process for operating reactors. Through the use of controls and metrics, the staff is currently meeting the Congressionally-reported metrics for the quantity of licensing actions reviewed annually, and the percentage of actions completed within one year. The NRC considers the current performance metrics appropriate to balance efficiency with safety. These measures recognize that schedule performance can be affected by licensee or NRC performance, and may need fluidity to account for emerging safety or security issues, or changes in licensee plans.

The NRC has launched several initiatives to focus on leveraging existing licensing processes to enhance efficiency, while maintaining a continued strong safety focus. For example, one initiative analyzed the issues that caused the backlog in processing amendment requests for reactor licensees, including issues related to the request for additional information (RAI) process, and provided recommendations to Office of Nuclear Reactor Regulation management regarding enhancements to the licensing review process. Such efforts resulted in reducing the inventory of licensing actions greater than one year old by more than 95 percent over the past years and enabled the staff to maintain this inventory at historically low levels. The staff's continual efforts in this area have significantly improved the NRC's ability to monitor safety reviews and improve timeliness.

QUESTION 15. **One purpose of the NRC's Project Aim 2020 is to "right size" the agency. However, there have not been any details on how NRC will determine what the size is or what expertise is needed in the agency.**

a. What exactly are the agency's goals for the size and critical skill sets to efficiently accomplish its mission?

b. What is the agency doing to forecast its workforce needs over the next 5 years?

ANSWER.

The NRC is committed to using its resources effectively and efficiently to accomplish the agency's mission to license and regulate the Nation's civilian use of radioactive materials to protect public health and safety, protect the common defense and security, and protect the environment. Determining the right number of staff the agency will need, and the critical skill sets staff will need to possess, requires a strategic planning process that forecasts the future workload, determines the workforce necessary to perform that work, and identifies strategies that will ensure the agency has the staff necessary to meet our mission. The NRC has

integrated human capital planning with broader agency operational strategies to more efficiently align workload, skills, people needs and organizational structure to meet both short-and long-term objectives. The NRC's enhanced strategic workforce planning process is implemented annually and ensures the insights from both one-year and five-year workload forecasts are considered in NRC's strategic planning, human capital management and budget formulation activities. The NRC anticipates additional benefits from the strategic workforce planning process that include increasing the range of skills and abilities of our people, while creating a more agile talent pool that will allow us to respond more quickly to unplanned changes in workload.

QUESTION 16. **The NRC hires contractors to perform some work, which the agency bills to licensees. It does not seem that NRC has much incentive to keep those contract costs down when the agency simply passes the bill to the licensee.**

a) What does the NRC do to ensure that contractors are not gouging licensees for the work they are performing?

ANSWER.

The NRC allocates a portion of the annual appropriation to contracts for services in support of the agency's mission, including fee billable licensee work. The NRC is subject to, and consistently follows, the Federal Acquisition Regulation (FAR) for Agency acquisition of products and services by contract and for ensuring that contract costs are reasonable, allowable and allocable under the contract. Supplementing the FAR, the NRC also follows the Nuclear Regulatory Commission Acquisition Regulation (NRCAR), which includes provisions on allowable contract costs. All NRC staff involved in awarding and administering contracts are trained to perform their work in compliance with Federal rules. As part of the standard acquisition process, the NRC employs a competitive process for awarding contracts, which

ensures that the agency is receiving necessary goods and services at a fair and reasonable price, and that work is being performed to meet the contractual requirements. When non-competitive contracts are utilized, the Contracting Officer (CO) ensures that the justification to do so is sufficient in accordance with the FAR. Before the contract is awarded, the CO analyzes the cost proposal to ensure that costs are reasonable, allowable and allocable under the contract. The NRC uses a best value approach in many cases to ensure the agency receives a quality product or service at the best value for the agency. A best value approach uses cost/price as one of the factors considered when awarding a contract along with additional criteria such as technical expertise, management expertise and past performance, amongst others.

In addition to following federal acquisition regulations, the NRC has successfully implemented acquisition approaches with the goal of minimizing contract costs. In 2012, the NRC implemented a strategic sourcing program to critically examine how the agency spends its funds and to find areas where improvements could be made. As a result of this program, the agency has successfully consolidated multiple contracts for the same or similar type of work under larger, enterprise-wide contracts which has promoted internal efficiencies as well as taking advantage of volume discounts. The NRC regularly uses government-wide and/or "best in class" contracts to obtain the best pricing available to the government for a particular product or service and uses enterprise-wide agreements with the Department of Energy (DOE) Laboratories for work that cannot be awarded to contractors due to organizational conflict of interest. The NRC also centralized acquisition to ensure procurement strategy is sufficiently scrutinized. With more rigor added to NRC's acquisition process, the agency has awarded more work to commercial contractors, oftentimes resulting in reduced cost to the agency by avoiding costly fees that are associated with single Interagency Agreements (IAAs) awarded to the DOE Laboratories.

The NRC relies on its professional Contracting Officer's Representatives (CORs) and COs to closely monitor the work being performed by contractors. NRC's CORs for both commercial contracts and IAAs with the DOE Laboratories are trained and held responsible for using contractor-provided Monthly Letter Status Reports, as agreed to in the terms of the contract/IAA, to ensure that the agency is billed *only* for work performed in an acceptable manner in-line with the requirements set forth in the contract. If and when a contractor bills for work that is not being performed, or work that is being performed in an unsatisfactory manner and requires corrective action, the COR must contact the CO before any invoice is approved. By continually and closely monitoring contracts/IAAs, the agency reduces the possibility of paying for unsatisfactory or unnecessary work. The NRC takes its fiduciary responsibility regarding contracting very seriously and works to ensure that the agency receives the products and services necessary to fulfill the agency's mission at the best value for the government.

QUESTION 17. **Can you elaborate on NRC's readiness for licensing advanced reactors?**

ANSWER.

The NRC is capable of reviewing and reaching safety, security, and environmental findings on an advanced reactor, or non-LWR design if an application were to be submitted today. The NRC and its predecessor agency, the Atomic Energy Commission (AEC), have significant historical experience with non-LWR designs. While the bulk of the regulatory and coordination activities for these non-LWR designs occurred prior to 1975, the NRC reviewed a variety of conceptual designs, at varying levels of detail, between 1978 and 2010. Examples include the Power Reactor Innovative Small Module (PRISM) liquid metal reactor, the Sodium Advanced Fast Reactor (SAFR) liquid metal reactor, the Modular High-Temperature Gas-Cooled Reactor (MHGTR), and the Pebble Bed Modular Reactor (PBMR). More recently, in February 2016, the NRC reviewed and approved a construction permit for a new and innovative medical isotope production facility submitted by SHINE Medical Technologies, Inc. These projects demonstrate

the NRC's ability to review new and innovative facility designs within the current regulatory framework.

Nonetheless, the NRC acknowledges the potential inefficiencies for non-LWR applications submitted under 10 CFR Part 50 or Part 52 that are reviewed against existing LWR requirements, using LWR-based processes, and licensed through the use of regulatory exemptions and imposition of new requirements where design-specific review, analysis, and additional engineering judgement may be required. The NRC's non-LWRs readiness activities are intended to address these potential inefficiencies and to provide increased regulatory certainty and predictability to non-LWR stakeholders.

The NRC staff has developed a vision and strategy to ensure that the agency is ready to review potential applications for non-light water reactor (non-LWR) technologies effectively and efficiently. The staff described the vision and strategy in "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," which was issued in December 2016. As stated in the vision and strategy document, the NRC has aligned its readiness activities to support the Department of Energy's (DOE's) identified deployment goal of having at least two non-LWR designs reviewed by the NRC and ready for construction by the early 2030s. To keep pace with the DOE's stated goals, the NRC plans to achieve its strategic goal of readiness to effectively and efficiently review and regulate non-LWRs by no later than 2025. In 2016, the NRC began executing its vision and strategy for licensing non-LWRs and has mapped out activities to achieve readiness by 2025. The NRC recognizes that non-LWR vendors may wish to commence pre-application activities or submit applications for review in the near-term, in advance of DOE's deployment goal. In those cases, the NRC will work with vendors on design-specific regulatory engagement plans and accelerate specific readiness activities, as needed.

To achieve the goals and objectives stated in the NRC's vision and strategy, the NRC staff has developed implementation action plans (IAPs). The IAPs identify the specific activities the NRC will conduct in the near-term (within 5 years), mid-term (5-10 years), and long-term (beyond 10 years) timeframes. The staff issued the near-term, mid-term and long-term IAPs on July 12, 2017. To complete all of the activities described in the near-term IAPs, the staff estimated needing an average of about $10 million per year. A better understanding of the priorities among the various non-LWR technologies being pursued would facilitate prioritization of readiness activities and resource planning. The NRC needs input from prospective applicants regarding their plans for regulatory engagement and the anticipated schedule for application submittals.

QUESTION 18. **How did NRC spend the $5 million provided in FY 2017 for advanced reactors?**

ANSWER.

The NRC has not yet fully expended the $5 million off-the-fee-base funds because these funds were not available until the third quarter of Fiscal Year (FY) 2017. During FY 2017, the NRC utilized the $5 million off-the-fee-base amount by obligating $1.04 million for salaries and benefits and $2.89 million for contract support. The remaining $1.07 million carried over to support salaries and benefits in FY18. The staff also expended approximately 5 FTE on-the-fee-base in FY17. The NRC transitioned from planning to execution and achieved the following significant accomplishments in FY17:

- Issued draft regulatory guide DG-1330, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors."
- Issued draft report titled, "A Regulatory Review Roadmap for Non-Light Water Reactors," describing flexible review approaches under existing regulations including

the use of a staged review process and the use of conceptual design assessments during the pre-application period.

- Issued draft guidance titled, ""Nuclear Power Reactor Testing Needs and Prototype Plants for Advanced Reactor Designs.""
- Reviewed submittals on licensing basis event selection and the use of probabilistic risk assessment (PRA) in support of the industry-led Licensing Modernization Project (LMP). The LMP's objective is to develop technology-inclusive, risk-informed, and performance-based regulatory guidance for licensing non-LWRs for the NRC's consideration and possible endorsement.
- Issued the draft and final regulatory basis for the emergency preparedness for small modular reactors (SMRs) and other new technology rulemaking. This rulemaking would establish a consequence-oriented approach to determine the appropriate size of emergency preparedness zones for SMRs and non-LWRs.
- Reviewed the Nuclear Energy Institute's paper titled "Proposed Physical Security Requirements for Advanced Reactor Technologies," and provided NRC feedback.
- Conducted 12 public meetings on a variety of regulatory topics to engage stakeholders and seek feedback.
- Conducted the third in a series of joint NRC/DOE Advanced Non-LWR Workshops.
- Developed Molten Salt Reactor training and conducted two staff training sessions.
- Actively participated in the development of consensus codes and standards including ASME Section III Division 5 for high temperature materials and the joint ASME/ANS PRA Standard for Advanced non-LWR Plants.
- Completed an evaluation of available analysis codes that could be used to perform confirmatory analysis for non-LWRs and selected a preliminary suite of analytical tools for further consideration and development.

- Conducted pre-application review activities with Oklo, Inc. (compact fast reactor designer).

The Honorable Shelley Moore Capito
(Questions for Chairman Svinicki and Commissioners Baran and Burns)

QUESTION 19. **The Committee commends the agency for the progress achieved to date under Project Aim 2020 to align NRC's budget and staffing levels to reflect the agency's actual workload. The NRC began FY 2018 with $30.7 million in unobligated prior year carryover and an agency staffing level that was 52 full-time equivalents (FTE) below the FY 2018 Congressional Budget Request (CBJ) staffing level. While the Committee acknowledges the challenges arising from budgets that are formulated two years in advanced of an appropriation, the agency has a responsibility to ensure that any excess funding attributable to reduced FTE are appropriately managed (e.g., held in reserve as unobligated funding).**

a. Please provide the monetized value of an FTE that was used in developing the FY 2018 CBJ.

b. How does the NRC treat carryover at the end of the year? Does it have to be used for FTEs?

c. Please discuss the internal controls used to ensure that funding excesses arising from reduced FTE levels are captured in the agency's budget execution processes (e.g., held in reserve as unobligated funding).

ANSWER.

a. The monetized value used for a full-time equivalent in the FY 2018 Congressional Budget Justification is $176,000.

b. At the end of the fiscal year, the NRC's unexpired, unobligated balances are carried forward into the next fiscal year for potential use to fund agency needs. The carryover can be used for salaries and benefits (FTE), contract support, and travel needs.

c. Any remaining unexpired, unobligated funds at fiscal year-end arising from reduced FTE levels are included as part of the new fiscal year initial unobligated funding balance that is held to fund agency needs.

- During the budget execution year:
  - Salaries and benefits funding (FTE) are centrally managed in the agency's official accounting system.
  - After approval of use, unobligated carryover is executed in a separate account from current year budgeted funds.
- At the end of the fiscal year, unexpired, unobligated balances carry forward into the next fiscal year and can be used for salaries and benefits (FTE), contract support, and travel needs.
- NRC's financial reports reflect the status of these funds.

QUESTION 20. **The NRC continues to state that it is prepared to review an advanced reactor now, but such a review might not be an efficient review. When can the NRC be prepared to conduct an efficient review of an advanced reactor, and what outside resources or input does the NRC need to get to that point?**

ANSWER.

The NRC staff has developed a vision and strategy to ensure that the agency is ready to review potential applications for non-light water reactor (non-LWR) technologies effectively and efficiently. The staff described the vision and strategy in "NRC Vision and Strategy: Safely

Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," which was issued in December 2016. As stated in the vision and strategy document, the NRC has aligned its readiness activities to support the Department of Energy's (DOE's) identified deployment goal of having at least two non-LWR designs reviewed by the NRC and ready for construction by the early 2030s. To keep pace with DOE's stated goals, the NRC plans to achieve its strategic goal of readiness to effectively and efficiently review and regulate non-LWRs by no later than 2025. In 2016, the NRC began executing its vision and strategy for licensing non-LWRs and has mapped out activities to achieve readiness by 2025. The NRC recognizes that non-LWR vendors may wish to commence pre-application activities or submit applications for review in the near-term, in advance of DOE's deployment goal. In those cases, the NRC will work with vendors on design-specific regulatory engagement plans and accelerate specific readiness activities, as needed.

To achieve the goals and objectives stated in the NRC's vision and strategy, the NRC staff has developed implementation action plans (IAPs). The IAPs identify the specific activities the NRC will conduct in the near-term (within 5 years), mid-term (5-10 years), and long-term (beyond 10 years) timeframes. The staff issued the near-term, mid-term and long-term IAPs on July 12, 2017. To complete all of the activities described in the near-term IAPs, the staff estimated needing an average of about $10 million per year. A better understanding of the priorities among the various non-LWR technologies being pursued would facilitate prioritization of readiness activities and resource planning. The NRC needs input from prospective applicants regarding their plans for regulatory engagement and the anticipated schedule for application submittals.

QUESTION 21. **Advanced nuclear reactor technologies offer innovative approaches to enhancing the safety and security of nuclear energy. As the NRC assesses safety, security, and emergency planning requirements for advanced reactors, to what extent is the Commission providing guidance or monitoring this work?**

ANSWER.

The Commission is closely monitoring the staff's non-LWR readiness activities. The NRC staff recently issued a Commission paper providing the status of these activities. During April 2018, the Commission plans to hold a public meeting on the NRC's activities to prepare for the effective and efficient review of non-LWR applications and to solicit feedback from external stakeholders. The NRC staff is also preparing Commission papers to address specific policy issues for Commission consideration. These include physical security requirements for non-LWRs and small modular reactors (SMRs) and functional containment performance for non-LWRs. The NRC staff, as directed by the Commission, is also preparing a draft proposed rule regarding emergency preparedness requirements for SMRs and other new technologies for Commission review.

QUESTION 22. **When nuclear power plant licensees need to modify programs or equipment, they often need approval from the NRC. The NRC has budgeted to review 700 such licensing actions in FY2018. The NRC staff conducted a business process improvement review earlier this year and found that 85 percent of these licensing actions require 300 hours or less. However, the performance goal for the NRC is completing 95 percent of their licensing actions in one year. For the licensing actions completed within the last year, please indicate:**

a) How many were completed in 6-8 months;

b) How many were completed in 8-10 months; and

c) How many were completed in 10-12 months.

ANSWER.

For the calendar year from January 1, 2017, to December 31, 2017, the total actions completed are:

a) Completed in 6-8 months: 267

b) Completed in 8-10 months: 312

c) Completed in 10-12 months: 247

For the fiscal year from October 1, 2016, to September 30, 2017, the total actions completed are:

a) Completed in 6-8 months: 204

b) Completed in 8-10 months: 245

c) Completed in 10-12 months: 264

QUESTION 23. **Please explain why the NRC does not have a more ambitious performance goal for completion of licensing actions.**

ANSWER.

The NRC continues to refine its licensing process for operating reactors. Through the use of controls and internal metrics, the staff is currently meeting the Congressionally-reported metrics for the quantity of licensing actions reviewed annually, and the percentage of actions completed within one year. The NRC considers the current performance metrics appropriate to balance efficiency with safety. These measures recognize that schedule performance can be affected by applicant, licensee, or NRC performance, and may need fluidity to account for emerging safety or security issues, or changes in licensee plans.

The NRC has launched several initiatives to focus on leveraging existing licensing processes to enhance effectiveness and efficiency, while maintaining a continued strong safety focus. For example, one initiative analyzed the issues that caused the backlog a few years ago in

processing amendment requests for reactor licensees, including issues related to the RAI process, and provided recommendations to Office of Nuclear Reactor Regulation management regarding enhancements to the licensing review process. Such efforts resulted in reducing the inventory of licensing actions greater than one year old by more than 95 percent over the past several years and enabled the staff to maintain this inventory at historically low levels. The staff's continual efforts in this area have significantly improved the NRC's ability to monitor safety reviews and timeliness in this process.

The Honorable Tammy Duckworth
(Questions for Chairman Svinicki)

QUESTION 24. **The NRC regularly conducts force-on-force testing at nuclear power plants, which are critical to ensuring we understand what our security vulnerabilities are at these facilities. Over the past decade the results have been fairly consistent with one failed exercise per year. When you consider that 21 to 23 plants are tested annually, this represents a sustained 5 percent failure rate. These tests, even with the occasional failure, provide the public comfort that they are being protected. Will the NRC continue to require these force-on-force tests at nuclear power plants? If not, why?**

ANSWER.

Force-on-force (FoF) tests or exercises are required by statute and NRC regulations. As such, the NRC will continue to require these exercises at nuclear power plants. In SECY-17-0100, "Security Baseline Inspection Program Assessment, Results And Recommendations For Program Efficiencies," dated October 4, 2017 (ADAMS No. ML17240A360), the staff identified three potential options for the Commission's consideration to improve the efficiency of the FOF inspection program: (1) maintain the current program of two NRC-conducted FOF exercises at each nuclear power reactor facility on a triennial basis; (2) revise the FOF inspection program to include one NRC-conducted FOF exercise, followed by a defense-in-depth Exercise 2 if the licensee's performance on the first FOF exercise is rated effective, or a second NRC-conducted FOF exercise if it is not; or (3) revise the FOF inspection program to include one NRC-conducted FOF exercise and an enhanced NRC inspection of a licensee-conducted annual FOF exercise. Each of these options maintains the current suite of baseline inspection activities conducted under the security baseline inspection program. The Commission is currently considering the staff's recommendations.

QUESTION 25. **During our oversight hearing, you shared with me steps you are taking to help restore a positive safety culture at the NRC. For example, you indicated that Commissioners have adopted an open-door policy where staff can bring issues and concerns directly to them. You have also instituted agency-wide trainings on how to engage in difficult conversations and how to raise issues.**
Can you elaborate further on other strategies you are employing to improve NRC's internal safety culture?

ANSWER.

The NRC employs surveys and self-assessments to support the continuous improvement of NRC's internal safety culture by fostering a greater climate of trust within the agency that includes three main goals: (1) strengthening a positive environment for raising concerns; (2) promoting a culture of fairness, empowerment and respect across the agency; and (3) establishing clear expectations and accountability for NRC leaders. For example, the NRC is offering the Franklin Covey *Speed of Trust* program at the agency. This initiative, currently underway, is designed as a 3-phased approach to provide workshops for employees that strengthens mutual trust among agency leaders, supervisors, and staff.

Additionally, the NRC supports multiple avenues for individuals to raise safety concerns including our differing views programs which include the Differing Professional Opinion program, Non-concurrence Process, as well as the Open Door Policy that you referenced. The NRC has also embarked upon the development of an explicit leadership model in an effort to describe the leadership characteristics, team attributes, and behaviors that we ask NRC employees to demonstrate as individuals, leaders, and organizations, in support of accomplishing our mission. When coupled with the NRC Principles of Good Regulation and Organizational Values, the Leadership Model can define and further shape the NRC's internal culture.

The Honorable Deb Fischer
(Questions for Chairman Svinicki)

QUESTION 26. **In keeping with testimony during the hearing, please describe the actions the NRC will take to restructure the uranium recovery office in light of the pending transfer of uranium recovery licensing to the State of Wyoming once it achieves Agreement State status.**

ANSWER.

The NRC's uranium recovery program consists primarily of staff within a licensing branch in the Office of Nuclear Material Safety and Safeguards (NMSS). This branch draws on the resources of staff in NMSS's environmental review and materials decommissioning branches, the Region IV field office in Arlington, Texas, and the Office of the General Counsel. Should Wyoming become an Agreement State, the NRC plans an organizational realignment to consolidate uranium recovery licensing with uranium recovery decommissioning into one branch to improve efficiency and effectiveness, and to maintain appropriate supervisor to staff ratios.

With respect to the allocation of annual fees in the uranium recovery fee class, the NRC staff is sensitive to the potential impact on the remaining NRC licensees and is evaluating several options and expects to provide recommendations to the Commission for its consideration in February 2018. The NRC will continue to provide updates on the progress of this issue prior to any public announcement.

QUESTION 27. **When will the NRC be able to provide the Committee with a copy of the NRC staff's recommendations for improving the accuracy and reliability of its cost estimates?**

ANSWER.

The staff has recommended and prepared an update to the NRC's cost-benefit guidance. The draft NUREG/BR-0058, Revision 5, "Regulatory Analysis Guidelines of the U.S. Nuclear

Regulatory Commission," is publicly available on the NRC web site at https://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0058/ and in the Agencywide Documents Access and Management System (Accession No. ML16182A034). This draft revision has been prepared to accomplish three objectives. First, this draft consolidates the NRC cost-benefit analysis guidance of NUREG/BR-0058, Revision 4, and NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook: Final Report" into one document. It also references the applicable portions of NUREG-1409, "Backfitting Guidelines." The draft cost-benefit guidance includes an expanded discussion of the NRC's regulatory analyses, backfitting guidelines, and National Environmental Policy Act analyses across NRC program offices. Second, this draft revision incorporates improvements in methods for assessing factors that are difficult to quantify and includes relevant best practices identified by the Government Accountability Office (GAO) in GAO-09-3SP, "GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs," and recommendations from GAO-15-98, "NRC Needs to Improve Its Cost Estimates by Incorporating More Best Practices." Third, this draft incorporates NRC experience and improvements in uncertainty analysis, as well as Commission direction on cost-benefit analysis since the last revision of these documents.

The final document, which considers public comment on the draft revision, will be reviewed and approved by the Commission this spring before it is published.

QUESTION 28. **One concern often raised about the NRC's cost estimates is the over-reliance on cost estimates provided by industry vendors. Such vendors have an incentive to underestimate costs when providing information to the NRC. Once the NRC imposes a requirement, licensees are hostage to whatever prices vendors may decide to charge.**

a) How will the NRC account for this bias in its cost estimating?

ANSWER.

The NRC's procedures for cost estimating use several techniques to avoid bias and address uncertainty. The procedures provide for collecting data from numerous sources, including previous cost estimates, interviews, surveys, public meetings, and cost data provided by vendors, licensees, technical experts, and other entities. By collecting data from multiple sources, the NRC cost analyst can assess possible bias in the data, including vendor-supplied data that may underestimate costs and lead to overly optimistic cost estimates.
When the NRC is provided vendor data, the NRC assesses the data for its reasonableness as a best estimate (e.g., neither overly conservative nor overly optimistic) and evaluates how the estimate could be influenced by factors that may not yet be finalized but could affect cost, such as changes in requirements, performance characteristics or testing requirements. The NRC documents any limitations of the analysis due to uncertainty or bias surrounding data or assumptions. This documentation helps to ensure that the cost estimate can be justified by acceptable estimating methods.

One cost-estimation practice that the NRC implements when performing its regulatory analyses is the quantification of uncertainty. The NRC performs an uncertainty analysis to adjust estimates to reflect unknown facts and circumstances in order to calculate the potential range of costs. The uncertainty analysis adds to the credibility of the cost estimate because it identifies the level of confidence associated with achieving the estimate should facts, circumstances, and assumptions change.

Through these steps, the NRC evaluates the supplied vendor information to determine whether it is supportable and suitable for use in preparing a well-documented, comprehensive, accurate, and credible cost estimate.

QUESTION 29. **The NRC's backfit rule, 10 CFR Part 50.109, applies to nuclear reactors. Does the NRC have classes of licensees which are not**

subject to a comparable backfit rule? If so, please explain why a backfit rule of some kind shouldn't equally apply to all licensees.

ANSWER.

The NRC's regulations contain several relevant backfitting provisions that apply to classes of licensees other than operating power reactors:

- 10 CFR Part 52 contains several issue-finality provisions that address backfitting for holders of various NRC approvals for nuclear power plants under Part 52;
- 10 CFR 72.62 applies backfitting to holders of general or specific independent spent fuel storage installation (ISFSI) licenses;
- 10 CFR 70.76 applies backfitting to licensees that possess greater than a critical mass of special nuclear material; and
- 10 CFR 76.76 applies backfitting to holders of certificates of compliance for gaseous diffusion plants.

Activities not licensed under one of the parts listed above would not be covered by the backfit regulations. In 1995, the Commission considered applying the backfit rule to materials licensees generically (SECY-95-061, ADAMS Accession No. ML12261A553). The Commission did not do so because of the challenges presented by the large and diverse number of licensees, activities, and uses of NRC-regulated materials. The Commission also took into account that other tools are used, as described below, to consider the costs of regulatory requirements for licensees while protecting public health and safety.

While the NRC has not extended the backfit rule to other licensees, it has applied principles of good regulation to ensure that new requirements are not imposed without considering the cost and benefits of the new requirements as they relate to public health and safety. The NRC has also relied on grandfathering provisions to not apply new regulations to licensees that were already operating under previous requirements.

QUESTION 30. **The Committee commends the Commission for actions taken to ensure stricter adherence to backfit rule, including formal training for inspectors, project managers, and supervisors. The backfit rule provides that imposition of new requirements, or reinterpretation of existing requirements, on licensees be subject to a rigorous cost-benefit analysis, with limited exceptions. Because implementation of a policy change inherently lags the policy change itself, there is concern regarding the potential for "de facto" backfits to continue until the policy change is fully implemented. Of particular concern is the potential for "de facto" backfits in the inspection arena where individual inspector's reinterpretation of regulatory requirements can result in imposition of new requirements outside of the formal backfit review process. Examples where the industry has raised concerns about such "de facto" backfits include inspection of the voluntary industry initiative to provide protection from an open phase condition (OPC) and the equipment qualification (EQ) programmatic review.**

a) Please describe the measures NRC will use to ensure that no "de facto" backfits occur through the inspection process.

b) Please discuss how NRC ensures consistency among the regions for inspections such as the OPC industry voluntary initiative and EQ programmatic review.

ANSWER.

a) The NRC has ensured that all NRC inspectors have completed training on backfit considerations. This training emphasized that NRC inspectors and license reviewers should not imply that a particular approach to meet a general requirement is essential – making such

implications is often the cause of "de-facto" backfits. Also, the NRC staff will continue to conduct monthly meetings with industry representatives for the purpose of receiving feedback on various inspection related issues and topics. This will include a discussion of instances where backfit considerations may have been raised, so that the staff can respond to industry's concerns.

b) OPC Voluntary Industry Initiative

The NRC issued Temporary Instruction (TI) 2515/194, "Inspection of the Licensee's Implementation of Industry Initiative Associated with the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01)," which is a set of instructions to inspectors to verify that licensees have appropriately implemented the voluntary industry initiative (VII) and gather the necessary information to allow the staff to determine whether the VII as implemented, adequately addresses potential OPCs. All inspectors have been trained on the TI to ensure consistent application of the inspection.

To ensure consistency during the inspection of the VII, issues involving the adequacy of each licensee's implementation will be documented as unresolved items (URIs) and reviewed by a panel to determine whether they represent performance deficiencies. The purpose of this panel is to maintain consistency of inspection findings among the regions. The panel will consist of electrical engineering specialists from each Region, representatives from the Division of Engineering and the Division of Inspection and Regional Support in the Office of Nuclear Reactor Regulation, and staff from other organizations as appropriate. The staff used a similar approach when assessing the Maintenance Rule inspection findings, ongoing post-Fukushima Mitigating Strategies inspection findings, and recently occurring Environmental Qualification inspections. The URIs will be dispositioned using the process established in Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports."

As directed by the Commission in SRM-SECY-16-0068, should disagreements arise between the NRC staff and the industry during implementation of the VII, and the related issues have policy implications, the NRC staff will promptly raise such issues to the Commission for resolution.

EQ Inspections

Regional managers and inspectors as well as engineering staff from NRC headquarters are conducting bi-weekly reviews of all EQ issues being identified through inspections. The purpose of this review is to ensure regional consistency of all EQ findings and to identify potential backfit issues for resolution. NRC staff is working with industry representatives, including the Nuclear Utility Group on Equipment Qualification (NUGEQ), to identify and resolve several industry issues of concern being identified through EQ inspections. These issues include possible examples of backfit concerns. On December 13, 2017, NRC management and staff conducted a public meeting with the industry for the purpose of discussing the concerns communicated to the NRC in the October 8, 2017, letter from the NUGEQ. In this December 2017 meeting, industry expressed various concerns to the NRC management and staff in attendance, including what they perceived could be backfit of EQ requirements by NRC inspectors. While no specific backfit examples were identified at the meeting, NRC management and staff are currently assessing the other EQ concerns that were raised by industry. The NRC plans to provide feedback to the industry by spring of 2018. Until then, NRC has made a decision not to pursue regulatory action for those issues where there is a question on backfit applicability. The staff has documented such issues as Unresolved Items (URIs). Resolution of these URIs will be made by NRC technical staff and will be reviewed by NRC senior management.

The Honorable Bernie Sanders
(Questions for Chairman Svinicki and Commissioners Baran and Burns)

QUESTION 31. **The NRC's decommissioning rulemaking process represents a critical opportunity for the Commission to improve decommissioning regulations. However, I am concerned that the comments of industry stakeholders, especially the Nuclear Energy Institute, are valued more than non-industry stakeholders, like host states. Many of those comments by non-industry stakeholders are directly related to topics the Commissioners asked NRC staff to consider, and are not being adequately addressed. These non-industry concerns appear likely to be addressed via guidance instead of the rulemaking process, whereas industry concerns appear likely to be codified by rules.**

a. Do you think there is adequate consideration of host community input in the decommissioning rulemaking process?

b. Do you think there are ways the Commission staff could improve the consideration and adoption of input by non-industry stakeholders?

ANSWER.

a) Yes. The NRC has provided members of the public, including host communities, several opportunities to participate in the agency's rulemaking process. In November 2015, the NRC published an advance notice of proposed rulemaking (ANPR) to gather information for the decommissioning rulemaking. The NRC received 162 comment submissions in response to the ANPR, and the NRC considered these comments in preparing the draft regulatory basis for the decommissioning rulemaking. On March 15, 2017, the NRC published the draft regulatory basis

for a 90-day public comment period (ADAMS Accession No. ML17047A413). On May 9, 2017, the NRC published the preliminary draft regulatory analysis for public comment (ADAMS Accession No. ML16271A511). The comment period for both documents ended on June 13, 2017. The NRC received 45 comment submissions, which resulted in over 1000 separate comments. The NRC considered all comments received on the draft regulatory basis and on the preliminary draft regulatory analysis in finalizing the regulatory basis. Another opportunity for comment will be provided to the public at the proposed rule stage; in accordance with the Administrative Procedures Act, the NRC will disposition all comments submitted on the docket. A comment disposition document will be part of the final rule package. Further, the NRC has held, and will continue to hold, public meetings throughout the rulemaking process.

The NRC considers all comments regardless of the comment originator. The NRC considers all comments equitably and reviews each comment with the same perspective on safety and security.

b) Each commenter regardless of affiliation is given equal opportunity to provide comments and the NRC staff evaluates all comments with the same criteria. Keeping the comment process equal to all stakeholders is consistent with the NRC's Principles of Good Regulation. From time to time, the NRC does provide additional opportunities during the rulemaking process for commenters. As noted above, the NRC has provided multiple opportunities for public comment on the decommissioning rulemaking, has conducted extensive public outreach on the rulemaking, and will provide several additional opportunities for comment before taking final action.

The Honorable Bernie Sanders
(Questions for Chairman Svinicki)

QUESTION 32. **What scientific basis is there for a 60-year timeframe for decommissioning?**

ANSWER.

As part of the recently published regulatory basis for the decommissioning rulemaking (ADAMS Accession No. ML17215A010), the NRC staff re-examined the technical basis for the 60-year decommissioning timeframe, which is primarily contained in two NUREG series reports prepared by the Pacific Northwest National Laboratory (PNNL). Specifically, NUREG/CR-0130, "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," issued May 1978, and NUREG/CR-0672, "Technology, Safety, and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," issued June 1980, discuss the technical conclusions associated with various decommissioning timeframes.

These reports were used to establish the 60-year decommissioning timeframe as part of the 1988 decommissioning rulemaking. The selection of 60 years represents a risk-informed, performance-based decision that balances (1) the time needed for the decay of several predominant radiological isotopes to reduce radiation exposures to workers; (2) the ability to effectively maintain safety and institutional controls throughout the project; and (3) the overall costs of decommissioning as a function of time.

Although the reports are more than 30 years old, the staff's re-examination of the technical assumptions, methods, and results used by PNNL found that all of the conclusions are still valid , even given changes in the way decommissioning is undertaken at several nuclear sites. In addition, to date all decommissioning nuclear plants have been able to complete decommissioning safely within this timeframe. Therefore, the recently published regulatory basis

does not identify a significant benefit to public health and safety that would result from a change to the 60-year timeframe, and does not recommend such a change.

QUESTION 33. **Will you commit to giving host communities, local and state government, and other stakeholders a meaningful seat at the table during the decommissioning process? If so, will this be addressed via rulemaking?**

ANSWER.

As part of the published regulatory basis for the decommissioning rulemaking, the NRC staff considered incorporating additional requirements on the role of State and local governments in the decommissioning process, but determined that no public health or safety improvements would be gained by such changes. Interactions with non-licensee stakeholders are determined on a case-by-case basis among the licensee and engaged stakeholders as necessary to address the specific situation at each facility. Therefore, the recently published regulatory basis does not recommend any additional rulemaking or other regulatory changes in this area.

Openness is among the NRC's organizational values and one of its principles of good regulation, and the NRC's practice is to share information with the public in a transparent manner whenever possible. For this reason, the NRC staff plans to continue to support decommissioning licensees as requested, in conducting community outreach, as has been done in the past at the majority of the decommissioning nuclear sites, but does not plan to require the formation, or dictate the level of input to the decommissioning process, of these groups. This flexibility will allow licensees to choose which type of program best suits the needs of their surrounding community. The formation of a citizens advisory panel has been an industry recommended good practice, and such panels are typically sponsored by States or licensees.

QUESTION 34. **The regulatory basis proposes changes to critical emergency protocols during decommissioning that are concerning to Vermont stakeholders. Has the NRC taken into account the public health, public safety, environmental, and economic impacts of a potential incident on host communities?**

ANSWER.

The NRC staff evaluated the emergency preparedness and response concerns of all stakeholders, including those in Vermont, during the development of the regulatory basis for the decommissioning rulemaking. The regulatory basis was developed, in part, based on the NRC's experience in addressing those emergency preparedness program elements that are needed during decommissioning, and identifying requirements that are commensurate with the reduced risk associated with the radiological and physical characteristics of a facility in decommissioning. As discussed in the regulatory basis, the NRC staff is recommending rulemaking for emergency preparedness and updates to associated implementation guidance to ensure that emergency preparedness and response requirements are established and maintained to adequately provide for public health and safety and protection of the environment during all phases of decommissioning. The NRC staff is recommending that the rule include risk-informed emergency preparedness requirements for the different phases of spent fuel management; when the spent fuel is contained in the spent fuel pool; when the spent fuel is transferred into a dry cask storage system; and until such time as the fuel is removed from the site.

With regard to economic impacts of a potential incident on host communities, as discussed in the regulatory basis, the NRC staff is recommending development of a rulemaking to expand the current NRC financial protection regulations, for both offsite and onsite, to require decommissioning licensees to meet financial requirements that are adjusted commensurate with the level of risk posed by a decommissioning plant.

QUESTION 35. **Financial assurances is an important topic to address via rulemaking to ensure that decommissioning is safe, timely, and complete. I am concerned with the proposal to allow decommissioning trust funds to be used for spent fuel management. Given that decommissioning trust funds include ratepayer money, how can the NRC justify using these funds for non-radiological purposes without guaranteeing that these funds can be recovered in full?**

ANSWER.

Financial assurance for decommissioning is an important topic being addressed in the NRC's decommissioning rulemaking. Consistent with its authority under the Atomic Energy Act of 1954, as amended, , the NRC's regulatory framework ensures that licensees provide reasonable assurance that, at any time during the life of the facility through termination of the license, adequate funds will be available to complete decommissioning. Decommissioning trust funds may include ratepayer monies through rate recovery for regulated utilities, non-by passable charges for merchant plants, and from other sources reflected within a licensee's revenue. The NRC has granted exemptions to enable certain licensees to use funds from the decommissioning trust fund for spent fuel management based on a finding of reasonable assurance that sufficient funding will remain available in the decommissioning trust fund to complete decommissioning, and upon a determination that the licensee meets the requirements in 10 CFR 50.12, "Specific exemptions."

As discussed in detail in the recently published regulatory basis, the NRC staff recommends rulemaking to allow a licensee in decommissioning to use decommissioning funds for costs associated with spent fuel management and specific-licensed independent fuel storage installation decommissioning (ISFSI). However, this use of decommissioning funds for these

purposes would only be permitted after the licensee first demonstrates that it retains sufficient funding, at all times, to complete radiological decommissioning. Allowing decommissioning funds that exceed the amount needed for decommissioning to be used for such expenses would better reflect the current environment in which a permanent repository for spent fuel does not exist and licensees are required to provide long-term onsite storage of spent fuel in an ISFSI.

State and local organizations such as public utility commissions remain responsible for establishing acceptable methods for fund collections from ratepayers, reimbursements, and site restoration requirements.

The Honorable Sheldon Whitehouse
(Questions for Chairman Svinicki and Commissioners Baran and Burns)

QUESTION 36. **The Trump administration has been pressing our independent regulators to make changes to policy to favor select industries. For example, earlier this year DOE directed FERC to adopt market reforms that would prop uneconomical coal plants and also to increase market incentives for nuclear.**

a) If pressured by the White House, would you sacrifice safety in order to support the nuclear industry?

ANSWER.

No.

QUESTION 37. **As I discussed during the hearing, I acknowledge that NRC is making strides to improve its ability to license advanced designs, but there is work to be done. To improve this pre-licensing framework, Congress appropriated $5 million for NRC to work on advanced reactor licensing for FY2017.**

a) How did NRC use the $5 million in funding for advanced reactor licensing that was included in the FY2017 spending bill? Please provide a detailed summary of the activities.

b) Why did NRC choose not to ask for additional funding in their request to Congress this year?

c) What are the biggest impediments to the timely completion of the licensing process for advanced reactors?

ANSWER.

a) The NRC has not yet fully expended the $5 million off-the-fee-base funds because these funds were not available until the third quarter of Fiscal Year (FY) 2017. During FY 2017, the

NRC utilized the $5 million off-the-fee-base amount by obligating $1.04 million for salaries and benefits and $2.89 million for contract support. The remaining $1.07 million carried over to support salaries and benefits in FY 2018. The staff also expended approximately 5 FTE on-the-fee-base in FY 2017. The NRC transitioned from planning to execution and achieved the following significant accomplishments in FY 2017:

- Issued draft regulatory guide DG-1330, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors.""
- Issued draft report titled, "A Regulatory Review Roadmap for Non-Light Water Reactors," describing flexible review approaches under existing regulations including the use of a staged review process and the use of conceptual design assessments during the pre-application period.
- Issued draft guidance titled, "Nuclear Power Reactor Testing Needs and Prototype Plants for Advanced Reactor Designs.""
- Reviewed submittals on licensing basis event selection and the use of probabilistic risk assessment (PRA) in support of the industry-led Licensing Modernization Project (LMP). The LMP's objective is to develop technology-inclusive, risk-informed, and performance-based regulatory guidance for licensing non-LWRs for the NRC's consideration and possible endorsement.
- Issued the draft and final regulatory basis for the emergency preparedness for small modular reactors (SMRs) and other new technology rulemaking. This rulemaking would establish a consequence-oriented approach to determine the appropriate size of emergency preparedness zones for SMRs and non-LWRs.
- Reviewed the Nuclear Energy Institute's paper titled "Proposed Physical Security Requirements for Advanced Reactor Technologies," and provided NRC feedback.

- Conducted 12 public meetings on a variety of regulatory topics to engage stakeholders and seek feedback.
- Conducted the third in a series of joint NRC/DOE Advanced Non-LWR Workshops.
- Developed Molten Salt Reactor training and conducted two staff training sessions.
- Actively participated in the development of consensus codes and standards including ASME Section III Division 5 for high temperature materials and the joint ASME/ANS PRA Standard for Advanced non-LWR Plants.
- Completed an evaluation of available analysis codes that could be used to perform confirmatory analysis for non-LWRs and selected a preliminary suite of analytical tools for further consideration and development.
- Conducted pre-application review activities with Oklo, Inc. (compact fast reactor designer).

b) The NRC's FY 2018 budget request was developed to ensure the agency can meet its mission and to be consistent with budgetary direction from the Administration.

c) There are multiple factors that could be impediments to the timely completion of the licensing process for advanced reactors. These include the wide variety of designs utilizing significantly different technologies under development, making it a challenge to prepare for all design types, and the uncertainty in the number and timing of potential applications, which makes planning NRC readiness activities and resources challenging.

As discussed in the response to Question 11, to complete the activities described in the near-term IAPs, the staff estimated needing an average of about $10 million per year. The Consolidated Appropriations Act, 2017 included $5 million excluded from fee recovery for non-LWR licensing readiness activities. The NRC is currently expending available FY 2018 on-the-fee-base resources and carryover -from the FY 2017 off-the-fee-base appropriations to continue to make progress on NRC's readiness activities in FY 2018. To ensure effective use of

available resources, the NRC is prioritizing its near-term activities to focus on advancing risk-informed and performance-based approaches and resolution of key technology-inclusive policy issues.

Senate Committee on Environment and Public Works
Hearing entitled, "Oversight of the Nuclear Regulatory Commission"
December 13, 2017
Questions for the Record for the Nuclear Regulatory Commission

Senator Edward Markey

QUESTION 1. **As Commissioner Baran said during the hearing, due to the lack of existing rules on the decommissioning process, decommissioned plants have traditionally been regulated under the same guidelines as operating plants. Consequently, plants seek exemptions to operating reactor regulations that are no longer relevant or appropriate, but there is not a specific set of rules that ensure ongoing site safety throughout the 60 years that plants have to complete the decommissioning process. It was also noted by Commissioner Baran that the system of granting exemptions provides less transparency and accountability than an official rule. The ongoing process for the integrated rulemaking on power reactor decommissioning is expected to conclude in late 2019. Entergy has announced that Pilgrim Nuclear Power Station will stop operations on May 31, 2019, possibly resulting in the decommissioning beginning before the final rule is announced. However, the decommissioning of Pilgrim Nuclear Power Station will take many decades.**

a. **Will the integrated rule on power reactor decommissioning apply to plants that have already decommissioned, which may include the Pilgrim Nuclear Power Station?**

b. How will plants in varying stages of the decommissioning process be treated once the rule is announced?

c. How does the Nuclear Regulatory Commission plan to communicate and enact the new responsibilities dictated by the final rule to the owners of plants already in the process of decommissioning?

d. Will the NRC work to ensure that the decommissioning process established by the final rule is more open and accountable to the public than the existing system of granting exemptions to operating plants?

e. How will the NRC incorporate this greater accountability and openness with regards to plants that are already in the process of decommissioning?

ANSWER.

a. The NRC envisions that the rule would be applicable to current and future nuclear power reactors, including facilities such as the Pilgrim Nuclear Power Station that are expected to enter decommissioning in the near term. The NRC does not intend to apply the rule to standalone former nuclear power reactor facilities where the license termination and decommissioning criteria in 10 CFR Part 20, Subpart E, have already been met (with the exception of an independent spent fuel storage installation (ISFSI) area that may remain).

b. In developing this rule, the NRC is considering an optional graded approach for several technical areas that would impose different requirements commensurate with the reduction in radiological risk at four levels of decommissioning: (1) permanent cessation of operations and removal of all fuel from the reactor vessel, (2) sufficient radioactive decay of fuel in the spent

fuel pool (as described in detail in the regulatory basis), (3) transfer of all fuel to dry storage, and (4) removal of all fuel from the site. Four technical areas covered by the rulemaking (emergency preparedness, physical security, cybersecurity, and onsite and offsite insurance) are considered for this graded approach. Plants for which the NRC has already approved decommissioning-related changes through exemptions or other regulatory action would generally not have new requirements imposed on them by this rule.

c. Through the NRC's rulemaking process, the public, including licensees, has had multiple opportunities to date to participate in and to comment on the NRC's approach. This includes the advance notice of proposed rulemaking and draft regulatory basis stages and when the proposed rule is published later this year. Further, the staff will also continue to conduct public meetings to communicate the new requirements being considered in the rulemaking. In addition, the NRC will use its cumulative effects of regulation (CER) process to engage with external stakeholders, including licensees for plants that are already in the decommissioning process, on the implementation of this rulemaking and related regulatory activities. As part of the proposed rule, the public will be asked specifically for feedback on CER, including potential challenges to implementing the rule on the planned schedule or unintended consequences of the rule's provisions.

d. Transparency and openness are fundamental objectives of the decommissioning rulemaking, and the rulemaking process is open to public input at multiple stages to inform the content of the proposed and final rules. Specifically, the NRC expects that the rulemaking will establish a process that limits the need for plant-specific exemptions and provides greater transparency as to the NRC's expectations for plants in different stages of decommissioning. In addition, as described in response (b) above, the NRC anticipates using a graded approach that is commensurate with the reductions in radiological risk at four levels of decommissioning. Use of

a similarly structured approach across multiple decommissioning topics should provide greater clarity in the framework for external stakeholders.

e. The NRC has conducted extensive public outreach, both formal and informal (e.g., through conference presentations) on this rulemaking. In addition, as described in responses (b) and (d) above, the NRC anticipates that using a graded approach would provide greater clarity for external stakeholders. These changes will apply, as appropriate, to plants already in the process of decommissioning.

QUESTION 2. **During the hearing, Chairman Svinicki noted that interagency cooperation on cyber security is limited to twice annual meetings with federal partners to monitor cyber threats and hear directly from them on emerging cyber issues. However, collaboration of this kind is very different from an active, regular training exercise undertaken to prepare for a possible threat events like a cyber-attack.**

a. Do you believe that the NRC should conduct a cyber-threat drill to ascertain the threats that this sort of attack could pose to nuclear reactors? If not, why not? If so, what steps is the Commission taking to implement such a drill?

ANSWER.

Operating reactor licensees conduct cyber security response exercises as part of their programmatic implementation of NRC regulatory requirements. NRC imposed initial cyber security requirements by Orders issued after the September 2001 terrorist attacks and the NRC's cyber security rule was finalized in March 2009, covering power reactor licensees and

applicants for new reactor licenses. Inspecting the licensee's program is part of the NRC's cyber inspection procedure.

In addition, the NRC conducts an annual cyber security tabletop exercise with other Federal agencies that are partners in responding to cyber events at nuclear power plants, to ensure roles and responsibilities are clearly understood.

The NRC also participates in interagency exercises, such as the upcoming Senior Officials Exercise (SOE) 18-1, Response to a Cyber Attack. In 2016, the NRC participated in the Ionic Shield exercise program, a US/UK exercise focused on cyber security in the nuclear sector. The exercise was led by U.S. Department of Homeland Security (DHS) and U.K. National Cyber Security Centre (NCSC) The exercise included a number of agencies and private entities in the two countries.

The NRC uses the lessons learned from these drills and exercises to improve the NRC's processes and procedures for responding to cyber events at nuclear power plants.

QUESTION 3. **On December 18, 2017, the NRC approved a request from Entergy to extend the date of implementation for the final milestone of the cybersecurity plan at Pilgrim Nuclear Power Station from December 15, 2017 to December 31, 2020. This new date is more than a year after the expected date of closure for the plant, and Entergy is expected to submit another amendment to remove the cybersecurity license condition at that point in the decommissioning process.**

a. Does removing the cybersecurity license condition leave plants like Pilgrim without a protective strategy against cyber threats?

b. Will the rule on the decommissioning process address potential ongoing cyber security needs at decommissioned plants like Pilgrim, and if so, how?

c. What type of cybersecurity protection is required by the NRC for plants currently in the process of decommissioning?

ANSWER.

a. At this time a license condition, currently in force in Pilgrim's license, still requires the licensee to implement selected cyber security controls, and to maintain the cyber security measures that it implemented to comply with the interim cyber security program, even after Pilgrim ceases operation. These cyber security controls protect the most significant digital components from the most significant attack vectors. The cyber security risks are significantly reduced once Pilgrim ceases operation and fuel has been removed from the reactor. Most of the safety systems are no longer required at that point, and the remaining systems that protect the fuel do not have a significant dependency on digital components. Should Entergy submit a license amendment request to remove its cyber security license condition, the NRC would evaluate the request on its merits at that time. Among the factors that the NRC would consider in deciding whether to grant the amendment would be the level of risk posed by a cyber-attack to the facility and the controls that are used to manage the aging fuel in the spent fuel pool.

b. Yes. The regulatory basis for the decommissioning rule recommends that the rule extend operating reactor cyber security requirements past the cessation of operations and removal of fuel from the reactor. Once all the spent fuel has sufficiently cooled in the spent fuel pool (a

period of approximately 10 months for a boiling-water reactor or 16 months for a pressurized-water reactor), however, the NRC staff has determined that the cyber security plans required by the license condition do not provide significant additional protection and, therefore, the license condition can be removed. See the answer to 3a for further details.

c. For plants currently in the decommissioning process, licensees have continued to implement cyber security controls that protect the most significant digital components from the most significant attack vectors for a period of time past the cessation of operations and removal of fuel from the reactor. Licensees have typically requested license amendments to remove cyber security license conditions once the fuel in the spent fuel pool has cooled sufficiently. The NRC staff has approved a number of these requests from licensees, based in part on the staff's determination that the cyber security plans required by the license condition do not provide significant additional protection once the spent fuel has sufficiently cooled. See the answer to 3a for further details.

Senator BARRASSO. Thank you very much, Chairman Svinicki.

Commissioner Baran.

STATEMENT OF JEFF BARAN,
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION

Mr. BARAN. Thank you, Chairman Barrasso, Ranking Member Carper, and members of the Committee.

Thank you for the invitation to appear today. It is a pleasure to be here with my colleagues to discuss the work of the Commission.

Chairman Svinicki provided an overview of NRC's activities, including the progress the agency is making in implementing Project Aim. I want to briefly highlight a few important efforts now underway at NRC.

NRC remains focused on post-Fukushima safety enhancements and lessons learned. The Commission is currently considering the draft final rule on mitigating beyond design basis events. That rule addresses a number of recommendations of the near term task force and is the culmination of years of work.

Meanwhile, the staff's focus is shifting to oversight and inspection of licensee implementation of several safety enhancements and natural hazard evaluations.

Decommissioning is another key issue for NRC. Since 2013 six U.S. reactors have permanently shut down, and seven more have announced plans to close in the coming years. Despite the growing number of affected units, NRC does not currently have regulations specifically tailored for the transition from operations to decommissioning.

As a result, licensees with reactors transitioning to decommissioning routinely seek exemption from many of the regulations applicable to operating reactors. The decommissioning rulemaking effort that is now underway will address this gap. It will allow us to move away from regulating by exemption in this area. The exemption approach is not very efficient and does not provide for public participation.

The rulemaking also provides a chance for NRC and all of our stakeholders to take a fresh look at our decommissioning process and requirements. States, local governments, non-profit groups, and the communities around these plants are very engaged and want to share their views. We need to thoughtfully consider their ideas with an open mind.

Even as some existing plants are decommissioning, there is a lot of interest in new advanced reactors. Five vendors have begun pre-application discussions with the staff, and we anticipate additional vendors may reach out in the near term.

We want to make sure that we have an efficient and effective licensing process for non-light water reactors and are ramping up our activities in this area.

We are happy to discuss these and any other issues of interest.

Thank you, and I look forward to your questions.

[The prepared statement of Mr. Baran follows:]

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, DC 20555
www.nrc.gov

Jeff Baran

The Honorable Jeff Baran was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission (NRC) on October 14, 2014, and is currently serving the remainder of the term ending on June 30, 2018.

Since joining the Commission, Commissioner Baran's priorities have included ensuring effective implementation of safety enhancements in response to the Fukushima Daiichi accident, improving oversight of power reactors entering decommissioning, and boosting the openness and transparency of agency decisionmaking. He has visited a number of NRC-licensed facilities, including operating power reactors, a nuclear plant undergoing active decommissioning, a research reactor, fuel cycle facilities, a low-level waste disposal facility, and a variety of facilities using radioactive materials for medical and industrial purposes. Commissioner Baran also traveled to Fukushima Daiichi for a first-hand look at conditions and activities at the site.

Before serving on the Commission, Commissioner Baran worked for the U.S. House of Representatives for over 11 years. During his tenure with the Energy and Commerce Committee, oversight of NRC was one of his primary areas of responsibility. As a senior counsel and later as Democratic Staff Director for Energy and Environment, Commissioner Baran worked on a range of NRC issues, including new reactor licensing, existing reactor oversight and decommissioning, high-level and low-level waste, and uranium mining, milling, and enrichment. He worked to coordinate the efforts of six federal agencies, including NRC, and two Native American tribes to clean up uranium contamination in and around the Navajo Nation. He also helped negotiate bills related to pipeline safety, energy efficiency, hydropower, and medical isotopes that were enacted with bipartisan support. From 2003 to 2008, he was counsel to the House Oversight and Government Reform Committee.

Prior to his work on Capitol Hill, Commissioner Baran served as a law clerk for Judge Lesley Wells of the U.S. District Court for the Northern District of Ohio.

Born and raised in the Chicago area, Commissioner Baran earned a bachelor's degree and a master's degree in political science from Ohio University. He holds a law degree from Harvard Law School.

January 2017

Senate Committee on Environment and Public Works
Hearing entitled, "Oversight of the Nuclear Regulatory Commission"
December 13, 2017
Questions for the Record for Commissioner Baran

For most of the questions, Chairman Svinicki has provided responses on behalf of the Commission. Individual responses from Commissioner Baran to three questions are provided below.

Senator Sanders:

1. I am concerned that the comments of industry stakeholders, especially the Nuclear Energy Institute, are valued more than non-industry stakeholders, like host states. Many of those comments by non-industry stakeholders are directly related to topics the Commissioners asked NRC staff to consider, and are not being adequately considered. These non-industry concerns appear likely to be addressed via guidance instead of the rulemaking process, whereas industry concerns appear likely to be codified by rules.

    a. Do you think there is adequate consideration of host community input in the decommissioning rulemaking process?

    b. Do you think there are ways the Commission staff could improve the consideration and adoption of decommissioning plant host communities?

Response:

Local communities and states are key stakeholders on decommissioning issues, and NRC needs to take their interests seriously. The decommissioning rulemaking is an opportunity for the agency to take a fresh look at the appropriate role of state and local governments in the process. As part of the rulemaking, we need to fully consider the comments of state and local governments with an open mind. The comments the agency received in response to the Advanced Notice of Proposed Rulemaking and Draft Regulatory Basis provide a number of constructive ideas for how to strike the right balance. As I consider the proposed rule in a few months, I will pay close attention to the ideas offered by state and local governments and other stakeholders.

2. On October 24th, 2017, the Commission met for the "Meeting on the Strategic Programming Overview of the Operating Reactors Business Line." You asked staff to explain an idea to allow the nuclear industry to do its own baseline engineering safety inspections. Are you concerned with the ramifications of the industry regulating itself? Is a policy that the NRC is considering?

Response:

As the NRC staff acknowledged during the October Commission meeting, the discussions about replacing portions of NRC's baseline engineering inspections with licensee

self-assessments have been preliminary, but I would be concerned about essentially turning over some NRC inspections to licensees to do themselves. I believe it is the role of the safety regulator, not the licensee, to perform baseline inspections because they are at the core of NRC's oversight of operating reactors. Any proposal to rely on new self-assessments would be a major change to the Reactor Oversight Process that the Commission would need to vote on.

Senator Whitehouse:

3. NRC and its Regulatory Independence:
   The Trump administration has been pressing our independent regulators to make changes to policy to favor select industries. For example, earlier this year DOE directed FERC to adopt market reforms that would prop up uneconomical coal plants and also to increase market incentives for nuclear.
   a. If pressured by the White House, would you sacrifice safety in order to support the nuclear industry?

Response:

No, I would not.

Senate Committee on Environment and Public Works
Hearing entitled, "Oversight of the Nuclear Regulatory Commission"
December 13, 2017
Questions for the Record for Commissioner Baran

For the questions to the Commission as a whole, Chairman Svinicki has provided responses on behalf of the Commission. Individual responses from Commissioner Baran to the questions directed to him are provided below.

Senator Markey:

1. During a public meeting in October, Nuclear Regulatory Commission staff discussed an industry proposal to replace parts of the baseline inspection program with self-assessments, where licensees would do components of the NRC inspections themselves. During the mid-December public meeting, industry and the Nuclear Energy Institute are going to present their position on how this self-assessment process could be implemented. The baseline inspection program is performed at all plants, and is a principal component of the NRC's oversight mission. It is deeply concerning that under this new proposal, the nuclear energy industry would be tasked with oversight of their own operations.
    a. Do you have concerns about the proposal to shift baseline inspection responsibilities from the Nuclear Regulatory Commission to the plant owners themselves? If so, please enumerate these concerns.

Response:

As the NRC staff acknowledged during the October Commission meeting, the discussions about replacing portions of NRC's baseline engineering inspections with licensee self-assessments have been preliminary, but I would be concerned about essentially turning over some NRC inspections to licensees to do themselves. I believe it is the role of the safety regulator, not the licensee, to perform baseline inspections because they are at the core of NRC's oversight of operating reactors. Any proposal to rely on new self-assessments would be a major change to the Reactor Oversight Process that the Commission would need to vote on.

2. So-called "dirty bombs" are made from a combination of conventional explosives and radioactive materials, producing an immediate dangerous explosion and a longer-term risk of contamination. In 2014, the Government Accountability Office performed an undercover investigation and successfully obtained licenses to purchase enough radioactive material to create a dirty bomb, despite using a forged license and sending an application from a fake safety officer, with a fake resume, who worked in a fake office with no security precautions.
    a. Are the standards for tracking the sales and licensing for Category 3 radioactive materials sufficient to protect the American public, and how has the Nuclear Regulatory Commission responded to the regulatory gap indicated by the GAO investigations?

Response:

The GAO report examining the effectiveness of NRC's radioactive source tracking regime provides an important reason to re-evaluate how NRC treats Category 3 sources. Although the report acknowledges that NRC and Agreement States have taken several steps "to help ensure that licenses are granted only to legitimate organizations and that licensees can only obtain such materials in quantities allowed by their licenses," GAO's covert testing identified a regulatory gap.[1] The failure of one Agreement State to conduct a proper pre-licensing site visit can be addressed through improved training and guidance. But the ability of GAO investigators to alter the paper license issued by the Agreement State in order to improperly obtain the Category 3 source from more than one vendor reveals a weakness in the underlying regulatory requirements. GAO's fictitious company was able to get two vendors to agree to provide a Category 3 source even though the license only entitled the fake company to one Category 3 source. GAO was successful because "NRC does not specifically require that the validity of Category 3 licenses be verified by the seller with NRC or the Agreement States—creating risks that licenses could be counterfeited or that licensees could obtain radioactive materials in quantities greater than what is allowed by their licenses."[2] As a result, GAO states that "NRC and Agreement States do not have assurance that their systems would prevent bad actors from altering licenses or fraudulently reporting the details of their licenses to transferors, accumulating dangerous materials by aggregation to Category 2 or larger quantities on the basis of those fraudulent licenses, and thereby endangering public health and safety."[3]

In light of GAO's findings, I proposed that the NRC staff take a fresh look at the question of whether and how to track Category 3 sources. My Commission colleagues agreed, and the NRC staff provided its recommendations in August 2017. The Commission is currently deliberating on this matter. As I review the staff's recommendations, I have an open mind about how to best address this regulatory gap. One option would be to require licensees transferring Category 3 quantities of radioactive material to verify licenses through NRC's License Verification System or with the relevant regulatory authority (NRC or the Agreement State).

3. In 2014, the Nuclear Regulatory Commission reduced the number of force-on-force exercises per inspection cycle (every 3 years) from three to two. These exercises are meant to assess how nuclear sites can protect against and respond to physical threats. The NRC also cut direct inspection hours by 17 percent. The NRC is currently considering potential additional changes to the force-on-force requirements, which could reduce the number of NRC-led exercises further or allow operators to replace the NRC's drills with industry-led exercises.
    a. Do you think further reducing the number of NRC-led force-on-force inspections would make it harder to assess whether our nuclear sites are properly protected from security threats?
    b. Do you think that replacing an NRC-led force-on-force exercise with one that is led by the operators would be as protective in diagnosing and assessing potential flaws in threat response strategies at nuclear power plants?

---

[1] Government Accountability Office, "Nuclear Security, NRC Has Enhanced the Controls of Dangerous Radioactive Materials, but Vulnerabilities Remain" (GAO-16-330) (July 2016) at highlights page.
[2] *Id.*
[3] *Id.* at 20.

Response:

As the question notes, under the staff's recommended option currently before the Commission, there would be no second NRC-conducted force-on-force (FOF) exercise. Instead, NRC would perform an "enhanced" inspection and evaluation of a regularly scheduled FOF exercise planned and conducted by the licensee. The licensee would both develop the exercise scenario and provide personnel for the adversary force.

I do not support this option, which does nothing to enhance the effectiveness of the FOF program. Going from two NRC-conducted FOF exercises to one would provide no security benefits. The only potential benefit would be to reduce the costs of conducting the exercises, and that outcome is far from certain. If a licensee were to be rated "ineffective" or "marginal" during the sole NRC-conducted FOF exercise or if the results were "indeterminate," then there are two possibilities. Either (1) NRC and the licensee would need to schedule, plan for, and participate in a second NRC-conducted exercise, which would eliminate the modest cost savings that the staff anticipated for this option, or (2) a nuclear power plant licensee would be allowed to operate without passing a single NRC-conducted FOF exercise during a three-year period. The first outcome offers no advantages over the current program, while the second outcome would be unacceptable.

Senator BARRASSO. Thank you, Commissioner Baran.
Commissioner Burns.

STATEMENT OF STEPHEN BURNS,
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION

Mr. BURNS. Thank you, Chairman Barrasso, Ranking Member Carper, and members of the Committee.

It is a pleasure to be here today. I appreciate the opportunity to testify and address our dedication to our safety and security mission, as we focus on ways to carry out that mission in an efficient and cost effective manner.

The Chairman's testimony accurately summarizes, in my view, the agency's significant efforts over the last several years to improve its efficiency and effectiveness, efforts that indeed continue.

I fully supported these efforts during my tenure as Chairman and in my current role as commissioner. The Commission, our senior leadership and our staff have demonstrated a proactive and responsible approach to good government through these efforts.

It is important to not lose sight of the fundamental safety and security mission of the NRC. From its inception, this congressionally mandated mission has driven the NRC and continues to be the central focus of what we do every day.

Having spent more than 37 years of my professional career with the NRC, I know there are times when we have had to learn from our experience, learn to do better and to improve our performance as a regulator, but on the whole, I can say without a doubt in my mind, I think we hit the mark the vast majority of the time in achieving a high standard of performance.

Over the past year we have continued to hold the industry accountable through our inspection and oversight program, ensured the effective implementation of lessons learned from the Fukushima Daiichi accident, focused on cyber security, worked effectively with our partners in the States to ensure the safe and secure use of radioactive material, and sought improved performance by fuel cycle facilities.

At the same time, we have undertaken reviews of the first small modular reactors submitted for design certification and of newly proposed facilities to produce radioisotopes for medical diagnostics and treatment. We prepared strategies to better prepare for the review of advanced reactor designs.

Credit belongs largely to the day to day work of our dedicated staff in achieving these accomplishments. I appreciate their day to day focus on ensuring adequate protection of the public.

Thank you for the opportunity to appear before you. I will be pleased to answer your questions.

[The prepared statement of Mr. Burns follows:]

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, DC 20555
www.nrc.gov

Stephen G. Burns

The Honorable Stephen G. Burns was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission (NRC) Nov. 5, 2014, to a term ending June 30, 2019. President Obama designated Mr. Burns as Chairman of the NRC effective Jan. 1, 2015.

Mr. Burns has a distinguished career as an attorney both within the NRC and internationally. Before returning to the NRC, he was the Head of Legal Affairs of the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development in Paris. In that position, which he held since April 2012, Mr. Burns provided legal advice and support to NEA management, carried out the legal education and publications program of the NEA, and provided advice and secretariat services to the Nuclear Law Committee and to the Contracting Parties to the Paris Convention on Third Party Liability in the Field of Nuclear Energy.

Mr. Burns joined the NRC as an attorney in 1978. Prior to assuming his post at the NEA, Mr. Burns served as General Counsel of the NRC from May 2009 until April 2012 after having served as the NRC's Deputy General Counsel from 1998. He also served as Executive Assistant to former NRC Chairman Kenneth M. Carr.

Mr. Burns received a bachelor's degree, magna cum laude, in 1975 from Colgate University in Hamilton, New York. He received his law degree with honors in 1978 from the George Washington University in Washington, D.C., where he was an editor on the George Washington Law Review.

Mr. Burns received the NRC's Distinguished Service Award in 2001 and the Presidential Meritorious Executive Rank Award in 1998 and 2008.

December 2014

Senator BARRASSO. Thank you, Commissioner Burns.

Thanks to all three of you for your testimony.

I am going to start with a round of questions.

Chairman Svinicki, in 2010—nearly 7 years ago—I wrote to President Obama about my concerns about the sale of the U.S. uranium assets of Uranium One, which is a Canadian company, to Rosatom, a Russian state owned company. I specifically raised concerns about future exports of U.S. uranium by Uranium One.

I believe the Obama administration's response to my letter was, at best, misleading. Responding on behalf of the President, the former Chairman of the NRC, Chairman Jaczko, stated, "In order to export uranium from the United States, Uranium One Inc. or its ARMZ," which was the subsidiary of Rosatom, "would need to apply for and obtain," he said, "a specific NRC license authorizing the export of uranium for use in a nuclear reactor."

We now know this is false. Uranium One did not need a specific NRC license to export U.S. uranium. Instead, Uranium One only needed to be—and later was—listed as a supplier on a transport company's NRC export license. Subsequently, Uranium One uranium has been exported overseas.

On Monday I sent a letter to the NRC in an effort to find answers to why this response was so inaccurate from former Commission Chairman Jaczko.

Chairman Svinicki, will you commit to providing me a timely and fulsome response?

Ms. SVINICKI. Yes, Chairman Barrasso. I and our Commission are in receipt of your letter received yesterday. I would note that as your letter makes clear, the responses you received have not fully depicted the complexity of this issue.

As the NRC, we welcome the opportunity to respond to the fulsome set of questions you have asked. I think it will allow us to depict in context and more accurately than the responses you have received. We look forward to doing that.

Senator BARRASSO. Thank you very much.

On another matter, the State of Wyoming is in the process now of becoming an NRC agreement State. This means the State of Wyoming would assume the role as the primary regulator for in situ uranium recovery.

I understand Wyoming submitted its final application to the NRC on November 13, 2017. Wyoming expects that the NRC will be able to sign a formal agreement with Wyoming by September 30, 2018, the end of the fiscal year. Can you commit to meeting that deadline?

Ms. SVINICKI. Chairman Barrasso, I am aware that the staff indicates they are on track to prepare a voting matter for the Commission, for our review, in the timeframe you have indicated. I know in the interim, it will be necessary for both the NRC staff and State of Wyoming officials to continue to work through any issues.

Assuming that goes well, I am not aware of any impediments to that; my objective is to proceed on that timeframe.

Senator BARRASSO. Thank you.

Last month, the NRC decided to increase the terms for uranium recovery licenses from 10 years to 20 years. The NRC recognized the low risk nature of the in situ uranium recovery activity. I ap-

plaud your leadership and the Commission's decisions on that. This is an issue I first raised a couple of years ago in 2015.

Now that the NRC has made this decision, I would like to know how the Commission plans to implement it. Will the Commission extend the terms of licenses that are currently pending at the NRC, or will the NRC act on a case by case basis? Will existing licensees need to wait until their licenses are amended or up for renewal to obtain a 20 year term?

Can you go through a little bit of that, what the plans are, and will the NRC be issuing a guidance document? If so, when can we expect to see that document? I would like some clarification, please.

Ms. SVINICKI. Yes, thank you for those questions.

This is a fairly recent policy change made by the Commission. Some of the exact implementation you ask about is probably still under development, but let me provide the details as I understand them.

I understand that we have two applications pending right now for renewal. We have contacted those two applicants and told them about the policy change and indicated that if they were to amend their application request, we would receive that.

It would require some work to look at a different timeframe for environmental and safety review. We would have to look at the extended period.

We have not received an indication from those two applicants of whether or not they intend to amend their applications and resubmit. As far as other applications submitted going forward, those would come under the new timeframe.

Senator BARRASSO. My final question is in October 2017, the NRC submitted a report to Senate appropriators on the progress made on licensing applications. The NRC's report states, "The NRC staff recently finalized an internal self-assessment that identifies possible efficiency improvements within the uranium recovery program."

What can you tell us about these efficiency improvements?

Ms. SVINICKI. It is a host of measures. I can give you some examples and perhaps for the record we could respond more fully.

Some of the things are to continue to urge applicants to have a very vigorous pre-application engagement and be able to provide better guidance to applicants on what a complete and full application needs to contain in order to be reviewed very efficiently by the agency.

Also, there will be new guidance for agency reviewers so that they will—as they are developing information requests for applicants—make a connection with the safety findings that need to be made.

I would characterize that many of them have to do with better communication with applicants during and before the application comes in and also improved training and guidance for NRC safety reviewers as they conduct the reviews. That is the nature of the improvements.

Senator BARRASSO. Thank you.

Senator Carper.

Senator CARPER. Senator Duckworth is on a tight timeline. I am going to yield to her. I will ask my questions in the next round.

Thank you.

Senator DUCKWORTH. Thank you so much, Mr. Chairman.

Thank you so much, Ranking Member Carper. That is very generous of you.

As a Senator focused on combating the threat of climate change, I do believe that nuclear power remains a vital tool in transitioning to a low carbon future. Across our nation, nuclear power generates more than half of all of our carbon free electricity, and we must make improving the safety of nuclear power plants a national priority if we are to avoid disasters like Fukushima in the future.

Chairwoman Svinicki, the nuclear power industry has a strategic plan titled "Delivering the Nuclear Promise," which aims to reduce operating costs by 28 percent. The NRC has a similar plan known as Project Aim whose objective is to reduce fees at NRC.

How are you working to ensure that these programs are addressing efficiency improvements but also not cutting corners when it comes to safety?

Ms. SVINICKI. Thank you, Senator Duckworth.

For our Project Aim initiative, as I noted in my opening comments, and I think my fellow commissioners testified as well, our vital safety and security mission is priority one. As we look, as an agency and as a regulator, to improve our own efficiency and effectiveness, our No. 1 guiding goal is that not diminish our regulatory capability or in any way distract from our important mission.

The industry's effort is their own, the "Delivering the Nuclear Promise." However, we have been monitoring that activity along the way. If we or our experts were to determine that anything related to their efficiency expert efforts were to indicate some sort of lack of focus on safety, then we would engage under our regulatory framework with them with our concerns about anything they were proposing to do.

To date, we have not noticed that as far as their efforts, their separate "Delivering the Nuclear Promise" efforts.

Senator DUCKWORTH. Thank you.

Commissioners Baran and Burns, do you have any comments you would like to make on this?

Mr. BARAN. I would just add that I agree completely with you, and that has to be our focus. I think that is maybe the biggest challenge NRC has right now. In the last couple of years, as a result of Project Aim, we made a lot of good changes and captured a lot of efficiencies, but in that time, we have seen our work force decline by 12 percent in 2 years. That is a significant amount of change.

Making sure that we are focused on our safety and security mission and we do not have any weakening of oversight I think is critical as part of that effort.

Senator DUCKWORTH. Thank you.

Mr. BURNS. I agree with what my colleagues said. I subscribe to what they said.

Senator DUCKWORTH. Thank you.

I think we can all agree that pinching pennies and saving on security inspections, for example, would not only endanger lives but also the future of the entire nuclear industry. Industry and safety stakeholders across my State have shared that the NRC has a

strong track record of intervening in safety issues when they occur at the nuclear power plant sites themselves.

However, I am concerned by NRC's own safety culture within the NRC. Internal data at the NRC indicates the Commission's work force appears to be uncomfortable raising safety issues.

Mr. Chairman, I would ask unanimous consent to enter for the record this report by the Union of Concerned Scientists, "The Nuclear Regulatory Commission and Safety Culture, Do As I Say, Not As I Do."

Senator BARRASSO. Without objection.

[The referenced information follows:]

The Nuclear Regulatory Commission and Safety Culture: Do As I Say, Not As I Do

Dave Lochbaum

February 2017

Union of Concerned Scientists

Dave Lochbaum is the Director of the Nuclear Safety Project in the UCS Global Security Program.

The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with citizens across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

More information about UCS and nuclear safety is available on the UCS website: *http://www.ucsusa.org/nuclear-power*

This report is available online (in PDF format) at *www.ucsusa.org/NotAsIDo*

The opinions expressed herein do not necessarily reflect those of the organizations that funded the work or the individuals who reviewed it. The authors bear sole responsibility for the report's content.

NATIONAL HEADQUARTERS
Two Brattle Square
Cambridge, MA 02138-3780
t 617.547.5552
f 617.864.9405

WASHINGTON, DC, OFFICE
1825 K St. NW, Ste. 800
Washington, DC 20006-1232
t 202.223.6133
f 202.223.6162

WEST COAST OFFICE
2397 Shattuck Ave., Ste. 203
Berkeley, CA 94704-1567
t 510.843.1872
f 510.843.3785

MIDWEST OFFICE
One N. LaSalle St., Ste. 1904
Chicago, IL 60602-4064
t 312.578.1750
f 312.578.1751

Workers at nuclear power plants are the front line of nuclear safety, and the ones most likely to detect safety problems when they arise. However, the safety of our nation's nuclear power plants suffers if workers are ignored or even retaliated against. Indeed, several nuclear plants have experienced such a chilled work environment and have had severe safety problems for just these reasons, notably the Millstone plant in Connecticut and Davis-Besse in Ohio.

The Nuclear Regulatory Commission (NRC), which oversees US power plants, believes that a positive safety culture—one in which there is a "collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment"—is vital to nuclear safety.[1] Safety should not be the only factor in decision making, but should be given proper emphasis. A positive safety culture is one that manages reactor safety risks despite aging equipment, staff turnover, budget cuts, and other challenges.

But it is not just nuclear plants that must maintain a positive safety culture—the NRC must, too. If plant workers are nuclear safety's front line, the NRC's inspectors and reviewers are the best insurance that the front line is fully staffed and reliable. NRC's workers must be confident that they can report any problems they observe without reprisal and that the NRC will address them. However, there are ample signs that the NRC itself has safety culture problems.

At nuclear power plants, the NRC does not directly assess safety culture; rather, that responsibility falls to the plant owners. However, it often gets indications that safety culture problems may exist. For example, plant workers have informed NRC inspectors that they are reluctant to report problems to management. Some workers have also alleged to the NRC that their employers have retaliated against them for raising safety concerns. In such cases, the NRC warns plant owners that a chilled work environment may exist at their plants, and this warning prompts the owners to take steps to assess and address the situation. The NRC's inspectors then monitor these activities. When dissatisfied by the pace or thoroughness of the efforts, the agency may take measures such as ordering owners to take additional steps or fining owners for missteps in their attempts to create a positive safety culture.

The NRC's interventions have restored a positive safety culture at several nuclear plants and prevented the accumulation of unresolved safety problems from growing to epidemic proportions. But evidence suggests that conditions *within* the NRC are as bad as—if not worse than—those that existed at these troubled plants. Just as nuclear plant owners have downplayed and dismissed clear and present signs about safety culture problems at their plants, the data suggest that the NRC's management is just as dismissive of indications that it has a poor safety culture. When it comes to chilled work environments, the NRC may have the largest refrigerator in town.

When the workforce and management in an organization have trust and confidence in each other, workers feel free to raise problems. When that trust gets broken, poor safety cultures develop. With clear evidence that a sizeable portion of the NRC's workforce lacks trust in NRC management, as outlined below, Congress must require the NRC to take the steps necessary to restore a positive safety culture—steps that the agency has successfully required so many plant owners to take.

[1] For additional information on the NRC's position on safety culture, see http://www.nrc.gov/about-nrc/safety-culture.html. For additional information on the NRC's position on safety culture for operating nuclear reactors, see http://www.nrc.gov/about-nrc/safety-culture/sc-nuclear-reactors.html.

Safety Culture Woes at Nuclear Plants

The Union of Concerned Scientists (UCS) examined some of the safety culture afflictions experienced at nuclear power plants over the past two decades—and what the NRC did to address those problems. This provides important context for considering the NRC's own safety culture, discussed later in the report. The two most egregious cases were the Millstone plant in Connecticut and the Davis-Besse plant in Ohio.

Safety Problems at the Millstone and Davis-Besse Plants

Millstone

The discovery of a large number of unresolved safety problems at the Millstone nuclear plant in the mid-1990s sharpened the NRC's focus on safety culture. Prominent among the many problems were the refueling practices for the Unit 1 reactor. The reactor's operating license prohibited the transfer of irradiated fuel bundles from the reactor core into the spent fuel pool within 150 hours after shut down in order to allow the fuel to cool; however, the fuel transfers frequently began before the 150 hours had passed. The reactor's safety studies assumed that only some of the irradiated fuel would be transferred into the spent fuel pool, but the routine practice was to offload the entire core into the spent fuel pool, with the heat load higher than the cooling system was designed to handle (NNECO 1993). All three reactors at Millstone were shut down in early 1996 to address these safety problems. Unit 1 never restarted. Units 2 and 3 remained shut down for more than three and two years, respectively (UCS 2006a; UCS 2006b). The NRC imposed a then-record $2.1 million fine for the many safety problems that had accrued over the years (USNRC 1997a). The costs of fixing the problems combined with no revenue being generated by the shutdown reactors nearly pushed the owner, Northeast Utilities, into bankruptcy.

Separate investigations by the plant owner, an independent contractor, and NRC inspectors revealed that these safety problems accumulated at Millstone because workers feared retaliation by management if they reported problems. The NRC fined the owner when it substantiated individual acts of retaliation and ordered the owner to hire an independent firm to oversee its Employee Concerns Program (USNRC 1996a; USNRC 1996b). Some nuclear plants maintain employee concerns programs to provide workers with a way to report safety or other concerns without going to their supervisors.

Davis-Besse

A few years later, safety culture problems mired another nuclear reactor in a two-year outage. In early March 2002, workers discovered extensive corrosion of the reactor vessel head at the Davis-Besse nuclear plant. A small amount of cooling water leaking from the reactor vessel over an extended period corroded away nearly six inches of the metal vessel, leaving only a quarter-inch-thick layer. Had that thin layer been breached, the rapid loss of cooling water through the opening could have caused an accident worse than Three Mile Island (Lochbaum 2016a; Lochbaum 2016b). A poor safety culture was the root of this problem, as management repeatedly stymied the cleaning and inspection efforts due to cost and pressure to restart the reactor as soon as possible.

The NRC imposed a record (as of this writing) $5.45 million fine for the many safety problems that accumulated during years of neglect (USNRC 2005). It took the Davis-Besse plant owner two years to fix its safety problems (UCS 2006c). The NRC allowed Davis-Besse to be restarted in March 2004 on the condition that the owner hire an independent firm to conduct annual assessments of the safety culture at the plant for at least five years (USNRC 2004a).

Safety Culture Woes at Other Nuclear Power Plants

Millstone and Davis-Besse may be the poster plants for safety cultures gone awry, but they certainly are not the only plants to experience the problem. In chronological order from the time of Millstone to the new millennium, other examples are:

1997 – Zion (Illinois)
The NRC informed the owner in July 1997 that it had received 27 allegations so far that year from plant workers, with more than half (15) of the allegations contending that management discriminated against or harassed workers for raising safety concerns (USNRC 1997b). The NRC conveyed its concern that this information suggested that plant workers might not report safety problems for fear of reprisals. The NRC requested a meeting with the owner to discuss steps it had taken and planned to take to ensure workers felt free to raise safety concerns. The company announced on January 15, 1998, that it was permanently closing the two reactors at Zion rather than attempt to correct the many known, unresolved safety problems (Feder 1998a).

1998 – South Texas Project (Texas)
The NRC determined that a supervisor retaliated against four workers for raising safety concerns, potentially creating an environment in which other workers would feel reluctant to raise concerns. The NRC ordered the owner to conduct periodic assessments of the safety culture at the plant and to factor input from employees into the annual appraisals of their supervisors (USNRC 1998b).

2004 – Salem and Hope Creek (New Jersey)
In January 2004 the NRC informed the owner of the neighboring Salem and Hope Creek nuclear plants about the results of a special review it had conducted in late 2003 (USNRC 2004b). The special review was conducted in response to the NRC's concerns about the work environment at the plants, particularly involving decisions to continue operating the reactors with safety equipment known to be broken and impaired. The owner retained three outside teams to investigate matters at the plants.[2] A workforce survey conducted by one team revealed that 15 to 20 percent of workers did not view the Employee Concerns Program as a viable method of reporting problems (O'Hanlon et al. 2004). All three teams concluded that the primary problem was untimely and ineffective fixes to safety problems. The repeated failures to fix safety problems gave many workers the impression that management simply did not care whether safety equipment worked or not.

The NRC made efforts to restore a positive safety culture, following up its January letter by meeting with the plant owner in March to ensure there was a common understanding of the problem and the steps to be taken to remedy it (USNRC 2004c). The NRC met with the owner again in October to review progress and remaining actions (PSEG 2004). The owner told the NRC that it had created an executive review board in April tasked with reviewing proposed disciplinary actions, promotions, and transfers of workers to ensure no adverse actions were taken for raising safety concerns. The owner also told the NRC that it had instituted monitoring in May for corrective actions that were overdue and those with target deadline extensions and in July began tracking the number of maintenance tasks needing to be redone.

2009 – Susquehanna (Pennsylvania)
The NRC received allegations in 2006 about a "chilled work environment" from workers performing refueling activities. A workforce survey conducted in late 2006 by the plant owner indicated safety culture problems within the maintenance and radiation protection departments. While the number of allegations received by the NRC dropped during 2007, the number significantly increased in 2008. In January 2009 the NRC issued a letter to the owner warning of a potential chilled work environment at the power plant (USNRC 2009a). The NRC ex-

[2] The three efforts were by the Synergy Consulting Services Company (December 2003), the Utility Services Alliances (March 2004), and the Independent Assessment Team (May 2004).

pressed concern that the company's efforts to stem and reverse a declining trend in the safety focus of the work environment at the site warranted more attention and better results. The NRC met with the owner in July (USNRC 2009b), listened to the owner's action plan, and outlined steps the agency would take to ensure that a proper safety culture existed at the plant.

2010 – San Onofre (California)

The NRC issued a letter to the plant owner in March 2010 stating that a significant increase in the number of allegations received from workers in different departments at the site indicated a growing reluctance among them to raise safety concerns (USNRC 2010a). Nearly 25 percent of the workers interviewed by the NRC believed that management would retaliate against individuals who relayed safety concerns to the agency. The NRC met with the plant's owner in September and heard about the 33-step action plan the management had developed to remedy safety culture problems at the plant (USNRC 2010b). The NRC met again with the owner in December (USNRC 2011). The owner updated the NRC about steps taken and provided results from metrics monitoring parameters such as the timeliness and quality of corrective actions taken to resolve safety issues.

2013 – Palisades (Michigan)

The NRC identified a chilled work environment within the security department at the plant in December 2013. A primary concern involved a security manager permitting unqualified individuals to hold security positions at the plant. In July 2014 the NRC ordered the owner to take several remedial steps, including five steps specifically intended to improve the safety culture within the security department (USNRC 2014a). The NRC conducted a follow-up security inspection in December 2014 to verify that these steps had been completed (USNRC 2015a).

2016 – Watts Bar (Tennessee)

The NRC issued a letter to the owner in March 2016 after receiving allegations from several licensed control room operators that management was making decisions based on meeting schedules rather than safety considerations (USNRC 2016a). The owner responded to the NRC in April identifying several senior management changes, communication efforts, and process changes that it had implemented to restore the positive safety focus at the plant (TVA 2016).

Financial Consequences of a Chilled Safety Culture

Poor safety culture manifested itself in two different ways at Millstone and Davis-Besse, but with similar adverse consequences:

> *At Millstone, employees felt constrained from raising issues because of a fear of retaliation, which is indicative of a poor safety conscious work environment. Employees at Davis-Besse, on the other hand, did raise issues, but they observed that these issues were not adequately addressed or were allowed to go uncorrected for long periods of time. While individuals continued to raise issues, little was done to address the issues they raised. Consequently, the effectiveness of the corrective action program was significantly reduced* (USNRC 2003a).

Whether workers were silenced or ignored, poor safety cultures prevented known safety problems from being corrected at Millstone and Davis-Besse. The longer the poor safety culture persisted, the longer the list of unresolved safety problems grew. The longer the list of safety problems, the more likely the NRC would require that the plant remain shut down until the backlog was eliminated.

The problems afflicting Millstone and Davis-Besse have often been characterized as having been caused by management placing production ahead of safety. But both reactors were shut down—not generating a dime of revenue—for more than two years while the owners paid more than $100 million for an army of workers to belatedly fix the problems. If management placed production ahead of safety, they obtained neither. These sites did not simply have

poor safety cultures—they had poor business cultures, too. Safety performance and financial performance are two sides of the same management competence coin.

The NRC's Actions to Remedy Safety Culture Problems at the Plants

In each of the examples above, intervention by the NRC was the catalyst needed for the owner to take steps to improve the safety culture at its plant. The plant owners had all the data available to the NRC plus considerable additional data, yet were unwilling or unable to connect the dots to see the full picture until induced to do so by the NRC. That's the bad news—external intervention was necessary to get the owners to take measures to restore a positive safety culture in which workers feel safe flagging the safety issues they observe.

The good news is that the NRC's interventions were both successful and sustainable.[3] Although several of the plants discussed above—including Millstone, Davis-Besse, and South Texas Project—have reported safety problems since these interventions, the causes have been such things as poor maintenance, deficient procedures, and equipment malfunctions, and not manifestations of a poor safety culture.

The NRC's Own Safety Culture

The NRC can best promote a positive safety culture at nuclear power plants by cultivating a positive safety culture internally. As the international Nuclear Energy Agency recognized:

> *By nature of its role, one of the stakeholders who most deeply influence the licensees' safety culture is the regulatory body.... Hence, the regulatory body needs to be conscious of its own safety culture's impact on the safety culture of the organisations it regulates and oversees in order not to hamper those organisations' willingness and efforts to take on their primary responsibility for safety. For this reason, it is paramount that the regulatory body not only consider safety culture as a matter of oversight, but also as a matter of self-reflection* (NEA 2016).

The NRC's mission involves establishing and enforcing regulations that manage the risk from nuclear plant operation to an acceptably low level. The NRC needs a positive safety culture in order to fulfill its vital mission. In the Millstone case described above, the NRC knew about the unsafe refueling practices but tolerated them via a "no blood, no foul" policy until the NRC's Inspector General identified the safety violations. In the Davis-Besse case, the NRC perceived the plant to be the safest in the region, if not the entire country, and reallocated its oversight resources to other plants. But by not looking at Davis-Besse, the NRC failed to notice the clear and present signs of danger. A half-baked safety culture at a plant and a half-baked safety culture at the NRC can add up to a fully-baked nuclear nightmare.

The evidence strongly suggests that the NRC's own safety culture is in distress. The good news is that the NRC knows how to remedy poor safety cultures—it merely needs to take the medicine it has prescribed so often to others.

The NRC has intervened when it became aware that workers—even if only a small number—at nuclear plants feared reprisals for raising safety concerns. For example:

- San Onofre (2010) – 25 percent of the plant's workers stated to the NRC that individuals would be retaliated against if they reported concerns to the agency (USNRC 2010a).
- Davis-Besse (2003) – 7 percent of the workers told the NRC they could not raise concerns without fear of retaliation (First Energy 2003).
- Salem/Hope Creek (2003) – 6 percent of the

[3] Zion was permanently closed soon after the NRC's intervention, making it impossible to know whether it would have been successful.

workers indicated to the NRC that they could not raise concerns to the Employee Concerns Program without fear of retaliation, and 6 percent indicated they could not raise concerns via the corrective action process without such fear (O'Hanlon et al. 2004). (Employee Concerns Programs allow workers to report problems—anonymously or confidentially if desired—outside their normal chain of command. The corrective action process is used by plant owners to comply with federal regulations that require safety problems to be found and fixed in a timely and effective manner.)

- Millstone (1997) – 11 percent of the workforce told the NRC that they knew of co-workers who would not report concerns to the Employee Concerns Program (Little Harbor Consultants 1997a).

Unfortunately, NRC's own workers have similar fears. NRC workers experienced the following:

- **Fear of reprisal:** The percentage of NRC workers who stated they could not disclose a suspected violation of any law, rule, or regulation without fear of reprisal increased yearly from 8 percent in 2010 to 13 percent in 2015 (USNRC 2015b). In 2016, 15 percent of NRC workers filing Equal Employment Opportunity complaints cited reprisal as the basis for the complaint (USNRC 2016b); in 2015 this reason was cited by 18 percent of the filers (USNRC 2015e). Even more disturbing, in 2012 the survey found that 39 percent of the NRC workforce did not believe they could report the truth to their supervisor without fear of reprisal (USNRC 2015b; USNRC 2014b).

- **Reluctance to formally disagree with an NRC position:** NRC workers may formally disagree with a final position taken by the NRC under the agency's Differing Professional Opinion Program (USNRC 2015c). The percentage of the NRC workforce that felt that using this program would have negative career consequences ranged from 22 percent in 2005 to 16 percent in 2009 to 18 percent in 2012. Similarly, in 2009 and 2012, only 15 percent of the NRC workforce reported that they would be willing to raise a concern via the differing professional opinion process.

- **Reluctance to refuse to sign onto an NRC final document:** NRC staff who review draft technical documents may elect under the agency's non-concurrence process not to sign onto the final document if they disagree with the contents. In 2013, 53 percent of the NRC workforce stated that their co-workers would not use the non-concurrence process to raise a concern (USNRC 2014c).[4]

The percentage of the NRC workforce that feared retaliation for raising concerns is comparable to, and sometimes higher than, the percentage of nuclear plant workers who feared retaliation, which compelled the NRC to intervene to restore a positive safety culture. The troubling situations at Watts Bar, San Onofre, Davis-Besse, Millstone, and other plants warranted the NRC's attention. The same situation within the NRC warrants attention, too.

The NRC took action when a fairly low percentage of workers reported retaliation for having raised safety concerns at nuclear plants:

- In 2014, the NRC concluded that the Security Department at the Palisades plant in Michigan had a chilled work environment because "some" security staff members believed two security supervisors had been fired for raising concerns (USNRC 2015d).

[4] Nuclear plant workers receive training on their legal obligation to identify safety problems, and most workers believe they will do the right thing even in the face of pressure. However, safety culture consultants have found that workers tend not to concede wrong-doing even within the confidentiality of a survey. Therefore, surveys often probe this subject by asking about co-workers' likely behaviors.

- In 2003, 8 percent of the workers at the Davis-Besse plant reported having been harassed, intimidated, retaliated against, or discriminated against for raising concerns, and 15 percent reported knowing co-workers who had experienced such treatment (First Energy 2003).

- In 1997, 39 percent of the workers at the Millstone plant reported knowing co-workers who had raised concerns and suffered repercussions.

- In 1997, the NRC received allegations from 15 workers at the Zion plant in Illinois (with a staff of nearly 1,000) that they had been discriminated against for raising concerns (USNRC 1997c).

And retaliation has also been reported by NRC's own workers:

- Of the NRC workers who submitted a non-concurrence report in 2013, 75 percent reported feeling that their subsequent performance appraisals were adversely affected, 63 percent reported that they had been excluded from work activities as a result, and 25 percent reported that they had been verbally abused by their supervisors and/or other NRC managers (2014c).

- Of the NRC workers who submitted a differing professional opinion in 2013, 22 percent reported that they had been excluded from work activities as a result, 11 percent reported that their subsequent performance appraisals were adversely affected, and 22 percent reported that they had been relocated or reassigned to a different job as a result (USNRC 2014b).

Once again, the percentages of NRC workers who reported reprisals after raising concerns is comparable to the percentages of nuclear plant workers who reported reprisals, which spurred the agency to intervene. Similar symptoms of a disease warrant similar treatments in response.

Congress Must Act

The owners of nuclear power plants with poor safety cultures rationalized away the information they possessed about these problems. Only after the NRC pointed out the problems did the owners see them and take the steps necessary to restore a positive safety culture. Similarly, NRC senior managers may be rationalizing away the agency's own safety culture problems. While three-quarters of senior and middle-level managers at the NRC have positive opinions of the agency's processes for handling differing views, less than half of the NRC's workers share that outlook.

Like nuclear power plant owners, NRC senior managers will probably also require external stimuli to compel them to take the steps needed to cure the agency's safety culture woes. Congress has oversight of the NRC and must induce the agency to take the same medicine it has so often prescribed for nuclear plant owners.

As a start, House and Senate oversight committees should hold hearings on NRC safety culture and bring in NRC managers to testify. There are two vacant seats on the NRC Commission; during their confirmation hearings senators should ask the candidates about their commitment to restoring a positive safety culture within the NRC. These and other congressional actions will help to strengthen the safety culture of the NRC, giving it the force to carry out its responsibilities for ensuring safe nuclear power for the nation.

REFERENCES

All references accessed December 15, 2016.

Feder, Barnaby J. 1998a. Nation's biggest atomic utility to shut 2 units. *New York Times*. January 16. Chicago, IL.

First Energy. 2003. Davis-Besse nuclear power station—Organizational effectiveness. Presentation to the Nuclear Regulatory Commission, October 1. Rockville, MD. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML032760119*.

Little Harbor Consultants (LHC). 1997a. Update on LHC oversight activities at Millstone. Presentation to the Nuclear Regulatory Commission. July 22. Rockville, MD.

Lochbaum, D. 2016a. Nuclear plant accidents: Three Mile Island. All Things Nuclear blog, July 26. Cambridge, MA: Union of Concerned Scientists. Online at *http://allthingsnuclear.org/dlochbaum/nuclear-plant-accidents-three-mile-island*.

Lochbaum, D. 2016b. Reactor core damage: Power excursion. All Things Nuclear blog, April 12. Cambridge, MA: Union of Concerned Scientists. Online at *http://allthingsnuclear.org/dlochbaum/reactor-core-damage-power-excursion*.

Northeast Nuclear Energy Company (NNECO). 1993. *Licensee event report 93-011-01*. October 18. Waterford, CT. Online at *https://lersearch.inl.gov/Index.aspx?Page=PDFView?Doc::2451993011R02.pdf*.

Nuclear Energy Agency (NEA). 2016. *The safety culture of an effective nuclear regulatory body*. Paris, France. Online at *www.oecd-nea.org/nsd/pubs/2016/7247-scrb2016.pdf*.

O'Hanlon, J., J. Durr, W. Krupp, B. Letts, P. Przekop, and N. Bergh. 2004. *Independent review responding to the January 28, 2004, NRC letter regarding the safety conscious work environment at the Salem and Hope Creek generating stations*. May 4. Artificial Island, NJ. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML041460492*.

Public Service Enterprise Group (PSEG). 2004. SCWE effectiveness metrics: Salem and Hope Creek generating stations. Artificial Island, NJ. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML043360041*.

Tennessee Valley Authority (TVA). 2016. Response to NRC letter concerning a chilled work environment for raising and addressing safety concerns at the Watts Bar nuclear plant. Chattanooga, TN. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML16113A228*.

Union of Concerned Scientists (UCS). 2006a. Millstone unit 2. Cambridge, MA. Online at *www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear_power/millstone-2.pdf*.

Union of Concerned Scientists (UCS). 2006b. Millstone unit 3. Cambridge, MA. Online at *www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear_power/millstone-3.pdf*.

Union of Concerned Scientists (UCS). 2006c. Davis-Besse. Cambridge, MA. Online at *www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear_power/davis-besse-ii.pdf*.

United States Nuclear Regulatory Commission (USNRC). 2016a. Chilled work environment for raising and addressing safety concerns at the Watts Bar nuclear plant. March 23. Atlanta, GA. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML16083A479*.

United States Nuclear Regulatory Commission (USNRC). 2016b. Update on EEO complaint trends. June 2. Rockville, MD. Online at *https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML16145A385*.

United States Nuclear Regulatory Commission (USNRC). 2015a. NRC's annual performance assessment of Palisades for 2014. April 9. Lisle, IL. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML15093A294*.

United States Nuclear Regulatory Commission (USNRC). 2015b. *2015 Federal employee viewpoint survey report*. Rockville, MD. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML16102A305*.

United States Nuclear Regulatory Commission (USNRC). 2015c. NRC Differing Professional Opinion Program. August 11. Rockville, MD. Online at *www.nrc.gov/docs/ML1513/ML15132A664.pdf*.

United States Nuclear Regulatory Commission (USNRC). 2015d. *Palisades nuclear plant—Safety conscious work environment issue of concern follow-up NRC inspection report 0500255/2014011*. January 20. Lisle, IL. Online at *https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML15020A067*.

United States Nuclear Regulatory Commission (USNRC). 2015e. Commission briefing on equal employment, outreach & diversity. December 3. Rockville, MD. Online at *https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML15342A321*.

United States Nuclear Regulatory Commission (USNRC). 2014a. Confirmatory order related to NRC report no. 05000255/2014406 and OI report 3-2013-018; Palisades nuclear plant. July 21. Lisle, IL. Online at

https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML14203A082.

United States Nuclear Regulatory Commission (USNRC). 2014b. Differing Professional Opinions Program assessment. Rockville, MD. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML14272A541.

United States Nuclear Regulatory Commission (USNRC). 2014c. NRC non-concurrence process. March 14. Rockville, MD. Online at www.nrc.gov/docs/ML1317/ML13176A371.pdf.

United States Nuclear Regulatory Commission (USNRC). 2011. Meeting summary for public meeting with Southern California Edison. January 4. Arlington, TX. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML110040916.

United States Nuclear Regulatory Commissions (USNRC). 2010a. Work environment issues at San Onofre Generating Station—Chilling effect. March 2. Arlington, TX. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML100601272.

United States Nuclear Regulatory Commission (USNRC). 2010b. Meeting summary for public meeting with Southern California Edison. September 30. Arlington, TX. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML102730452.

United States Nuclear Regulatory Commission (USNRC). 2009a. Work environment issues at the Susquehanna steam electric station—Potential chilling effect. January 28. King of Prussia, PA. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML090280115.

United States Nuclear Regulatory Commission (USNRC). 2009b. NRC Susquehanna safety conscious work environment (SCWE) public meeting. July 6. Berwick, PA. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML091940189.

United States Nuclear Regulatory Commission (USNRC). 2005. Notice of violation and proposed imposition of civil penalties. April 21. Rockville, MD. Online at www.nrc.gov/docs/ML0510/ML051090552.pdf.

United States Nuclear Regulatory Commission (USNRC). 2004a. Approval to restart the Davis-Besse nuclear power station, closure of confirmatory action letter, and issuance of confirmatory order. March 8. Lisle: IL. Online at www.nrc.gov/docs/ML0406/ML040641171.pdf.

United States Nuclear Regulatory Commission (USNRC). 2004b. Work environment for raising and addressing safety concerns at the Salem and Hope Creek generating stations. January 28. King of Prussia, PA. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML052620612.

United States Nuclear Regulatory Commission (USNRC). 2004c. Management meeting between NRC and PSEG assessment plans for Salem and Hope Creek. March 18. Rockville, MD. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML040830072.

United States Nuclear Regulatory Commission (USNRC). 2003a. Letter to the Hon. Dennis J. Kucinich. June 30. Rockville, MD. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML031530077.

United States Nuclear Regulatory Commission (USNRC). 1998b. Confirmatory order modifying license (effective immediately) and exercise of discretion. June 9. Rockville, MD. Online at www.nrc.gov/reading-rm/doc-collections/enforcement/actions/reactors/ea97341o.html.

United States Nuclear Regulatory Commission (USNRC). 1997b. Notice of violation and proposed imposition of civil penalties. December 10. Rockville, MD. Online at www.nrc.gov/reading-rm/doc-collections/enforcement/actions/reactors/ea96034.html.

United States Nuclear Regulatory Commission (USNRC). 1997c. Safety conscious work environment at the Zion Station. July 22. Lisle, IL. Online at https://adamswebsearch2.nrc.gov/webSearch2/view?AccessionNumber=ML12074A021.

United States Nuclear Regulatory Commission (USNRC). 1996a. Notice of violation and proposed imposition of civil penalty. June 4. King of Prussia, PA. Online at www.nrc.gov/reading-rm/doc-collections/enforcement/actions/reactors/ea96059.html.

United States Nuclear Regulatory Commission (USNRC). 1996b. Order requiring independent third-party oversight of Northeast Nuclear Energy Company's implementation of resolution of the Millstone Station employees' safety concerns issues. October 24. Rockville, MD. Online at www.nrc.gov/reading-rm/doc-collections/enforcement/actions/reactors/ea96439.html.

Senator DUCKWORTH. Thank you.

Chairwoman Svinicki, when management and the work force have trust and confidence in each other, workers feel free to raise problems. When that trust is broken, poor safety cultures develop.

What steps are you taking to restore a positive safety culture at the NRC because I almost feel like the industry feels better about the NRC than the people within the NRC themselves?

Ms. SVINICKI. Thank you for that question.

These are important indicators as we survey our own staff about their comfort in raising issues with their management or through an open door policy. As a matter of fact, all members of our Commission currently adopt an open door policy and have meetings where staff can bring issues and concerns directly to members of our Commission.

We have instituted agency-wide training of having difficult conversations and how do you raise issues. I think we try to monitor best practices across corporate America of how do you have the right culture of people feeling very free to speak out and bring issues forward.

We monitor and look for best practices and benchmarking. We try to bring those lessons, training, and culture back to our organization but we monitor that closely. We would, I am sure, want to be the model of having an open and free environment for people to raise concerns.

Senator DUCKWORTH. Thank you.

We have had disposal leaks in my State. It is extremely important that we have vigorous Government oversight over our nuclear plants and that the experts we hire to oversee this work feel empowered at every level to do it well.

I understand that NRC regulations prohibit nuclear power plants from discharging water into rivers that exceed a certain temperature threshold. Chairwoman, how is climate change impacting the ability of nuclear power plants to operate amidst increasing river temperatures? For example, will the NRC seek revision to that current regulation, and are current regulations impacting the operations of nuclear power plants today?

Ms. SVINICKI. Thank you for that question.

My understanding is the upper bound, the temperature limits you spoke of for discharging water, plant output into other bodies of water are set based on very rigorous safety and environmental analysis.

I think that if the climate were warming, our analysis would still be the same. We would probably encounter more frequent circumstances of plants needing to reduce their power input based on not exceeding that level.

I do not know that we would automatically raise the lowest levels. I think you would see cases where plants more frequently needed to down power, as we call it. They would need to reduce their power output in order to respect the level.

Senator DUCKWORTH. Thank you.

I am out of time. Thank you, Mr. Chairman.

Senator BARRASSO. Thank you very much.

Senator Inhofe.

Senator INHOFE. Thank you, Mr. Chairman.

Chairman Svinicki, we have been doing this for a long time. We have been watching the changes that have taken place. In fact, the Clean Air and Nuclear Safety Subcommittee was the first subcommittee I chaired on this Committee 23 years ago.

The mission is a vital one. We want our nuclear plants to be safe, and they are safe. For several years, we have increased oversight of the NRC's budget and questioned why the NRC has continued to grow despite a shrinking industry. Seven reactors have announced plans to close, and another 20 are at risk of closing prematurely.

We have also raised concerns about the NRC's declining productivity. In 2000 the NRC accomplished more work with fewer resources, as you can see in this chart. In response to this scrutiny, the NRC initiated Project Aim 2020 "to transform the agency over the next 5 years to improve the effectiveness, efficiency, and agility of the NRC."

However, it appears that Project Aim 2020 will end early this coming year. While progress has been made, I do not think the NRC has really achieved its transformation.

Chairman Svinicki, you and I have had discussions about the right sizing of the agency. I know you have been chairman for only a few months now, but do you agree there is still room for a lot more improvement in this area?

Ms. SVINICKI. Thank you, Senator Inhofe.

The agency has made many efforts under Project Aim. I know there have been concerns expressed that Project Aim 2020 is terminating early. I would observe that the agency has institutionalized many of the Project Aim activities. The need now is to develop agency efficiency improvement initiatives for the Office of Management and Budget. I would say that we are now marrying the Project Aim efforts into the broader kind of culture at the agency that says where we can find improvements in efficiency and effectiveness, we are doing that.

I do not observe that we are necessarily winding down the Project Aim early. For example, under Project Aim, we began an enhanced strategic work force planning initiative. It gets to your concern about right sizing.

This enhanced strategic work force planning is intended to improve the fidelity of our resourcing; how many people and what kind of expertise do we need to do the forecasted work that we have.

We are piloting it now in three of the offices within the agency. That pilot will conclude in July 2018. Then we will be looking at agency-wide implementation. Again, this is just one aspect but it is the human resource and right sizing aspect to improve our understanding of the kind of people and capacity that we need.

Senator INHOFE. That is good, and I appreciate that.

Let me ask you another question. This is the broad question that I don't have the answer for.

I can remember many years ago, we wanted to enhance the position and our portfolio of energy, of nuclear. We went through a thing with 8 years of the Obama administration. He had his war on fossil fuels, coal, oil, and gas, so you would think at that time, he would be wanting to go toward something that did not have the

footprint he was trying to avoid. That would be nuclear, but he did not want nuclear, either.

Now we have a new Administration. The war on fossil fuel has ended, but we still are not getting where we need to be in nuclear. Look at France and all the other countries with the proper place for nuclear energy. We are just not getting there.

What seems to be the problem in the United States? I thought maybe when the new Administration came in, maybe the problem was we are now depending more on coal, oil, and gas, and for that reason, we are not advancing in nuclear.

What is your thinking, or any of the other members? Why aren't we doing what I believe and what I think most members—certainly all the Republicans—believe we should be doing to enhance the position of nuclear in the United States?

Ms. SVINICKI. My understanding is that the principal contributors are larger economic and market mechanisms that I know the Department of Energy and the Federal Energy Regulatory Commission would focus on, but they fall outside the domain of the Nuclear Regulatory Commission.

I understand those to be the principal contributors to the lack of deployment of additional nuclear in the United States.

Senator INHOFE. You guys, what do you think?

Mr. BARAN. I think the Chairman is right. I think low wholesale electricity prices are a significant factor.

Mr. BURNS. I would agree with the Chairman as well. Essentially, it is those types of market forces, low price of natural gas, and other types of things like that.

Senator INHOFE. I just want to see that red arrow going the other way.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you, Senator.

Senator Carper.

Senator CARPER. Thanks, Mr. Chairman.

Again, I would like to welcome everyone. Thanks for your attendance, your responses, and your service.

At the beginning of his comments, the Chairman mentioned he sent a letter to you asking a number of questions. We have some concern on another front with respect to EPA not responding to questions from our side of the aisle. A number of my colleagues have been very supportive of our efforts to get the information we deserve and need.

I would just like to say, make sure the majority, particularly the Chairman in this case, gets the information he needs. You don't have to belabor this, but I would like to have some response as to whether you agree to reaffirm your willingness to be responsive to the questions from all of us as we go forth.

Ms. SVINICKI. Yes, Senator.

Senator CARPER. Thank you.

Mr. BARAN. Absolutely.

Mr. BURNS. Yes.

Senator CARPER. Thanks so much.

I have one other question that kind of relates to the Chairman's letter to you. This would be for Commissioner Burns.

Were you the General Counsel of the NRC at the time Uranium One and RSB license reviews were taking place?

Mr. BURNS. If you can refresh me; this was around 2010?

Senator CARPER. Yes, I think so.

Mr. BURNS. 2010, yes, I was the General Counsel from 2009 until early 2012.

Senator CARPER. It is my understanding that unlike nuclear reactors, the Nuclear Regulatory Commission regulations do not prohibit foreign ownership and control of uranium milling operations.

In fact, it is not unusual for these to be partially fully owned by foreign companies. Again, we are talking about milling as opposed to refining.

Go ahead.

Mr. BURNS. You do not have the prohibition for production and utilization facilities. However, as with all licensing, you have to reach an inimicality finding, that it is not inimical—that is an unfortunate word in the statute—to the common defense and security. That is a finding you have to make in licensing determinations.

Senator CARPER. Correct me if I am wrong; I believe it is the NRC career staff, not the Commissioners, who make the decisions when it comes to the transfer of the milling NRC license or to an amendment to an export license; is that correct?

Mr. BURNS. I think that is generally true. There are circumstances where if you had a contested matter which the Commission, in its adjudicatory role, would have to decide, it would come to, but I will have to refresh myself as we prepare to answer Senator Barrasso's questions.

I don't think that was the case, that there was not a contested or adjudicatory decision that came before the Commission at that time.

[The referenced information follows:]

As a general rule, the NRC career staff approves applications for transfer of control for 10 CFR 40 materials licenses. If an application were to be contested, it is possible that a hearing decision may be appealed to the Commission for its review.

Commission-level review and approval is, however, required for proposed exports of the risk-significant commodities identified in the NRC's regulations at 10 CFR section 110.40. For these types of proposed exports, career NRC staff initially review the export license applications in accordance with sections 126, 127, and 128 of the Atomic Energy Act of 1954, as amended, and if required, submit the results of their reviews to the Commission. If the Commission approves an export, career staff in the Office of International Programs issues a license to the applicant.

For proposed exports that are not identified in 10 CFR section 110.40, the Commission has delegated the authority to review, approve, and issue the export licenses to the NRC career staff. Proposed licenses for export of natural uranium to Canada, including proposed amendments to an existing export license to add a supplier as a party to the license, do not require Commission-level review. Nonetheless, the Commission would have a role if the application were to be contested through the adjudicatory process.

No contested or adjudicatory decision came before the Commission in 2010 regarding the transfer or control of several NRC licenses from Uranium One, Inc., a Canadian corporation, to JSC Atomredmetzoloto and its subsidiaries.

No contested or adjudicatory decision came before the Commission in 2012 during the amendment to RSB's export license (XSOU 8798) to add Uranium One as a party to the license, and also no contested or adjudicatory decisions came before the Commission on the subsequent four amendments to export license XSOU8798 issued to RSB for which Uranium One was a party.

Senator CARPER. My memory is maybe not what used to be either but if you find you want to add something for the record in response to my questions, that would be fine.

I would also ask you answer for the record, do you believe the NRC staff followed all appropriate regulations and guidance for Uranium One and RSB reviews and decisions? If you want to respond to that now, you may, or you may respond for the record.

Mr. BURNS. I think I will respond for the record because again, having just seen the letter come in, as I say, I don't have a robust recollection of the particular circumstances at that time. I would appreciate the opportunity to do that.

[The referenced information follows:]

Although I was not personally involved in either review, to the best of my knowledge, NRC staff followed all appropriate statutes, regulations, and guidance for the approval of the transfer of control of several NRC licenses from Uranium One, Inc., a Canadian corporation, to JSC Atomredmetzoloto and its subsidiaries in 2010, and in issuing RSB's export license XOU8798 in 2012.

Senator CARPER. All right.

Let us talk a little bit about morale. You used to be at the top of the charts, the Nuclear Regulatory Commission, for many years, No. 1 in terms of morale, down to No. 11. I think you went down to 12, maybe up to 11; you are coming back to the right direction. No. 11 with a bullet, I hope, as they say at Billboard.

Commissioner Baran, can you take a minute and tell us about the impact of the recent budget cuts? Do you feel these cuts have impacted morale, and can the NRC still complete the work it needs to do in a timely manner?

Mr. BARAN. Thank you for the question.

I think you are right that the Project Aim effort and the budget cuts have had an impact on morale. I think that is primarily because there are few opportunities for promotion, often reduced training and rotational opportunities.

We need to make sure, at the agency, that we retain the tremendous talent that we have. It is really a terrific work force. It is still a great place to work. I am hopeful that one of the things we can do with strategic work force planning tools is to help the staff better see if they want to get to a certain position in a few years, what are the particular skills they would need to work on, the training, the rotational opportunities, to get themselves in a position to advance in that position or to move into those positions.

I think that is giving the staff a better sense of what the opportunities are at NRC and what they need to do to get themselves in the position to take advantage of the opportunities. I think that will further help morale. I think we are starting to head in the right direction, but it has been a challenging time.

Senator CARPER. I have some more questions about new reactors and a couple of other things. Maybe we will have another round. I am interested in asking some questions concerning advanced reactors.

Thanks for your responses, and I will look forward to the responses for the record, Mr. Burns.

Thank you.

Senator BARRASSO. Thank you, Senator Carper.

Senator Capito.

Senator CAPITO. Thank you, Mr. Chairman.

Thank you all for being here today.

On March 8, the very same day that we had a legislative hearing on the Bipartisan Nuclear Energy Innovation and Modernization Act, which we have joined together on, the GAO published a report on the NRC's budget structure and justifications.

In my view, one of the things I found troubling in the report was it seems as though the NRC is keeping two sets of books, "one to formulate its budget and another to obligate funds based on its appropriations for Congress."

To put it another way, the NRC creates in its budget a public consumption for Congress but then operates under a separate budget under its internal operations, making it tough for authorizers and appropriators—which I am an appropriator, and obviously we are the authorizers—to discern how the NRC is actually spending taxpayer dollars.

As an example, according to the NRC's monthly report, the NRC had 3,241 full-time equivalents this past September. The budget justification is for 3,405 FTEs. If you multiply that out, that is about $25 million in "extra funding." In other words, FTEs that were budgeted for but were not actually filled. I believe Mr. Baran mentioned that the work force is down 12 percent.

I would like an explanation of where are these extra dollars that were actually appropriated that were not fulfilled by the FTEs who were actually working at the NRC and some fleshing out of where that is. Does that mean your budget request in the future would be lower because you were able to roll over this money? How does that work?

Ms. SVINICKI. Thank you for the question, Senator.

If I can supplement this answer for the record, there are a lot of moving parts here. It is true that over the course of the last budget year, we were conducting a reduction in force, and we were, through attrition, getting smaller in the area of FTE.

The difference in funding I would forecast probably will or has shown up as carryover money from one budget year to the next. If our staffing levels at the end of the year ended up being lower than the requested budget, some of that would likely materialize as carryover funding into the fiscal 2018, current fiscal year.

It is difficult, as we develop the agency budget 2 years in advance since, we are reducing employment levels; it is difficult for us when we submit the budget to forecast the exact difference.

Again, the period you are discussing was a period of continued decline in staffing levels. We probably hit a little bit under the target and had fewer staff at the end of the fiscal year. I think, in general, it is a forecasting error, but the money likely would show up as carryover.

Senator CAPITO. When you say carryover, does that mean you carry over to the next year, and then you subtract that from your budget request the upcoming fiscal year?

Ms. SVINICKI. I can check for the turnover of the fiscal year this fall but often appropriations clerks will ask us for updated estimates of carryover as we approach the end of the fiscal year.

Sometimes appropriators make an adjustment in the enacted level based on the carryover since we tend to have the enacted levels after the start of the fiscal year.

Senator CAPITO. Do you know if the NRC treats this carryover or extra amount you have at the end of the year as a fungible line item; does it have to go to FTEs? How do you treat that?

Ms. SVINICKI. I am not certain if the treatment is consistent year to year. Could I take that for the record and provide a response?

Senator CAPITO. Yes, please.

Ms. SVINICKI. Thank you.

Senator CAPITO. I would say anecdotally you are not the only commission or Government agency that is falling into this category. I don't know, according to the GAO, it was not a satisfactory way to actually present the reality of where your budget is, where the actual spending is, and what happens to this extra or carryover amount.

I think that needs to be tracked and needs to be accounted for. Any additional information you can provide in written form would be much appreciated.

Ms. SVINICKI. I would also add that in response to that GAO report, I know both House and Senate Appropriations have instituted basically additional control points for the execution of our budget.

The monthly report you cited is one of the outgrowths of our monthly reporting to our consistency with those budgetary control points.

Senator CAPITO. I would even say in October 2017 you budgeted for 3,293, when in actuality it is 3,137. The pattern is still continuing. Realizing that you cannot get it down to 1 or 2, I get that, but the numbers are significant, I think 156.

With that, I would just ask if we could submit a question or our staff could get with you to get more details on this. Thank you.

Ms. SVINICKI. Yes.

Senator BARRASSO. Thank you, Senator Capito.

Senator Markey.

Senator MARKEY. Thank you, Mr. Chairman.

Commissioner Baran, right now the United States has restarted negotiations with Saudi Arabia on nuclear cooperation. Both during the campaign, it turns out, and after becoming Trump's National Security Advisor, General Flynn was seeking to begin that process.

So far the Administration has refused to meet the legal requirement to keep Congress fully and currently informed of any initiative in negotiations relating to a new and amended agreement as required by the Atomic Energy Act.

Last week Trump's Energy Secretary, Rick Perry, visited Saudi Arabia to discuss their bids to build new nuclear reactors. It has been reported that these deals may allow for enrichment of uranium, which all previous U.S. agreements have prohibited.

The NRC has oversight responsibility over the export of nuclear source materials and technology. Has the NRC been consulted on the export of these potentially sensitive nuclear technologies?

Mr. BARAN. As part of the 123 agreement process, NRC, as you mentioned, has a role. It comes later in the process when there are certain statutory findings the Commission must make in order for

the 123 agreement recommendation to go to the President. We are not at that stage yet.

Senator MARKEY. If the agreement does allow for the enrichment of uranium or reprocessing of plutonium, do you think that could pose a proliferation in safety risks?

Mr. BARAN. It is challenging to answer that question without having any sense of what is actually agreed to there.

Senator MARKEY. Let me ask it another way. Does a country need to be able to enrich or reprocess in order to have a civilian nuclear power program or can they bring the uranium in?

Mr. BARAN. No, it is not necessary.

Senator MARKEY. Not necessary, OK. Thank you.

The Nuclear Regulatory Commission staff granted the Pilgrim Nuclear Power Station an exemption from the requirement that a seismic probabilistic risk assessment be performed. This is a great concern since Pilgrim saw a bigger increase in seismic risk during its post-Fukushima hazard reevaluation than any other nuclear power plant.

The reevaluation found that Pilgrim has a seismic hazard that is significantly higher than the plant was designed to withstand. Seismic assessments are very important. These are used to evaluate how safe nuclear sites are from earthquakes and can be used to determine what improvements and changes need to be made to protect the sites and surrounding communities from disaster.

Commissioner Baran, while the NRC staff decided that Pilgrim is not required to do this assessment, do you think that station should voluntarily perform a seismic analysis?

Mr. BARAN. This was, as you mentioned, a staff decision. I think the staff, in this case, made the wrong decision. Given the particular set of circumstances at Pilgrim, I think NRC should have required the detailed seismic risk assessment that would have been completed by the end of the year.

Senator MARKEY. I agree with you. I think that is the position the NRC should be taking.

Since 2015 Pilgrim has been assessed as having multiple, repetitive operational safety violations. Mr. Baran, the NRC is currently undertaking a rulemaking to govern the decommissioning of plants. As Pilgrim moves toward decommissioning in 2019, is there any insight you can provide as to how that rulemaking will take operational and physical safety into account?

Mr. BARAN. With regard to Pilgrim, it may be that the rulemaking is complete after Pilgrim has already shut down. It may not be directly applicable to Pilgrim depending on what the ultimate timing is. I think the staff is aiming to complete a rulemaking package for a draft final rule for Commission review by the end of 2019.

As I mentioned in my opening remarks, I think it is going to be a very good move to move away from the regulation by exemption approach we currently have. I think it makes sense to have, as we do for operating plants, a detailed list of the regulatory requirements, safety and security requirements that apply to a permanently defueled, decommissioned plant.

We don't have that right now. This rulemaking would accomplish that. I think that is a good move.

Senator MARKEY. I think it is imperative that the new rules on decommissioning emphasize operational and physical safety long after these plants have stopped generating electricity.

I might just say about the state of this industry, obviously Westinghouse went bankrupt trying to complete the local plant. That is not because of any attempt by granola chomping, tree hugging liberals to stop the construction of that plant. It had nothing to do with it.

It had to do with the very fact that it is very hard and very expensive to build nuclear power plants that are safe. They are under tremendous pressure obviously from the wind and solar industries which is why there is an attempt by the fans of all these alternative energy generating sources to take away the benefits for those competing sources of energy.

I might just say in response to the gentleman from Oklahoma when he talked about the war in the Obama administration on coal, gas and oil, that there was a dramatic, historic rise in oil and natural gas production during the Obama administration, a dramatic rise. Amongst other things, the drop in the price of natural gas is what has led to wind and solar, the very difficult economic conditions within which the nuclear power industry is trying to survive.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you, Senator.

Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman.

Madam Chair, as I understand it, Wyoming will likely become an NRC agreement State in 2018. As a result, the State of Wyoming will then begin regulating its uranium recovery facilities in place of the NRC doing that.

Seven of the nine uranium recovery facilities who paid fees to the NRC in 2017 are located in Wyoming. The other two are located in South Dakota and in my home State of Nebraska.

The NRC determines its uranium recovery annual fees by dividing by the number of facilities. How will the NRC maintain the Uranium Recovery Office to ensure the two remaining licensees are not unfairly burdened with an extreme increase in those regulatory costs?

Ms. SVINICKI. Thank you, Senator, for this question.

Although our Commission has not grappled with this, I have been monitoring the potential impact that agreement State status for Wyoming would have in the financial structure of how we recover costs.

I will speak for myself and not for my colleagues that this is a management challenge. I appreciate that you have raised it. Already our director of the relevant office and our chief financial officer are looking at this question.

With Wyoming taking a significant number of the entities now paying fees for uranium recovery regulation, this will be a step change for us. This isn't a small change; this will be something we are going to have to look at the structure of how we are recovering these costs.

I would like to provide a fuller answer to you for the record on exactly where the chief financial officer's examination of the ques-

tion resides. Again, it is a definite issue, but I am confident that we are foreseeing it and looking at it now.

Senator FISCHER. I would appreciate you responding for the record. That would be helpful.

I would also appreciate if you could keep our office informed on the progress you are making on that before you announce any decision publicly so that we would be able to have some input and also review with you.

Ms. SVINICKI. Yes.

Senator FISCHER. Also, Madam Chair, this Committee has tasked the GAO with reviewing the NRC's cost estimating practices in the wake of concerns that the NRC significantly under estimated the cost of implementing its filtered vents proposal.

In December 2014 the GAO released a report that was fairly critical of the NRC's development of cost estimates stating the NRC's procedures "do not adequately support the creation of reliable cost estimates and that the filtered vents cost estimate did not fully or substantially meet any of the four characteristics of a reliable cost estimate."

The GAO recommended that the NRC align its cost estimating procedures with relevant cost estimating best practices identified in the report. However, the NRC staff rejected that advice stating, "The NRC does not believe, however, that the standards used by GAO to assess our program are appropriate."

More recently, for all 10 monthly reports to this Committee, the NRC has stated, "The staff has not yet taken any action to develop specific metrics for assessing the quality of its cost-benefit analysis."

To summarize, 3 years have passed. The NRC staff rejected GAO's advice, and there are no metrics in place to assess the quality of the NRC's cost-benefit analysis. My question would be what basis does the NRC have for assessing whether the cost-benefit analyses used by the Commission for decisionmaking are, in fact, reliable?

Ms. SVINICKI. Thank you for that question.

Our Commission recently requested the staff provide an update to us on the response to the GAO recommendations. I don't dispute your description of the intervening time period, but we have now been informed by the agency staff that the staff is updating the cost-benefit guidance documents.

The changes being incorporated include recommendations from the GAO's 2014 report findings, including that the agency adopt relevant cost estimating best practices identified in the GAO's 2009 guide or authoritative best practices that the GAO referred to.

This is the staff's communication to the Commission of their current activities underway. We will look forward to updating you. I do not have a date for when that would be published. I think it is 2018, but we can provide that answer for the record.

Senator FISCHER. I have a couple other questions I would like to submit for the record, Mr. Chairman.

Thank you.

Senator BARRASSO. You are certainly welcome.

When Senator Markey referred to tree hugging and granola crunching individuals, I know that did not apply to any specific member of this Committee.

With that, let me recognize Senator Whitehouse.

Senator WHITEHOUSE. Mr. Chairman, I resent that remark. I represent that remark.

[Laughter.]

Senator WHITEHOUSE. Welcome, all. Thank you for your work.

I would like to focus with you all for a little bit on the question of advanced reactor licensing. As you know, I have been persistent about trying to open the possibility of next generation advanced nuclear technologies with the ultimate holy grail, if possible, of finding nuclear technologies that can allow us to go through our nuclear waste stockpile and try to turn that into valuable energy rather than leave it lying out there as a massive public health and financial liability.

The bill I have authored and co-sponsored is still in process. We have, I think, considerable support for it. It is very bipartisan. In the meantime, you all received an additional $5 million appropriation for advanced reactor licensing.

I wanted to get your sense on how far that $5 million takes you. Does that take you 1 percent of the way to where you need to be, 2 percent, 10 percent, or can you wrap your hands and say, job done, we are all set with that money?

Let me put it another way. You are not supposed to ask for more money, so let me say if you continue to get that additional $5 million year after year, what timeframe does that put you on for achieving your goal with respect to advanced reactor licensing?

I know you are responding to all of our concerns about this by doing things administratively. Could you fill me in on what is happening administratively and what the $5 million does for you in the context of what you are trying to achieve?

Ms. SVINICKI. Thank you for that question.

I will start and my colleagues will probably remember some good points that I am not going to remember.

Making sure that NRC is engaged and part of the dialogue that is going on between the Department of Energy, the designers of these new designs, and the National Laboratories is, I think, the most important use we have put that $5 million to. I think having the regulator in the room is important.

We are bringing to that engagement and have created a strategy document and then a series of implementation plans. Those are focused toward NRC developing the regulatory capacity. Some of that is knowing different fuel cycles and different material types, what kind of capacity and expertise we need to bring in an informed way to the engagement as the community of designers of these advanced reactors want to push forward.

It is also important that NRC experts be present with the Department of Energy and the National Laboratory experts because I have learned that the researchers that DOE and the National Labs are actually drawing upon are the earliest experiences of the atomic history of the United States because some of the reactor designs are really not entirely new. They are designs this country did experimental work on or prototyping in the 1960s and 1970s.

Senator WHITEHOUSE. So this $5 million is generally being used on outreach and connection with other facilities?

Ms. SVINICKI. The implementation plans allow us to look at what DOE is doing, what the Labs are bringing to the table, and what the vendors are identifying as the gaps and needs for information that they have.

Our implementation plans are kind of iterative based on the engagement we are going by. We don't want to have total gaps in our expertise and regulatory capacity where we have to throw up our hands and say, we don't know anything about that type of material, so we are never going to be able to approve its use in a nuclear reactor.

I think going forward, we get to taking that framework and applying it to specific technical issues. From a budgetary standpoint, I think that is where it gets more expensive because then the labs need to be doing things, and we need to be weighing in on their testing and data plans and say, if you collect this data, will it be sufficient for us to make a regulatory determination. I think the framework is essential. We have spent the $5 million on that.

Senator WHITEHOUSE. My time is running out now so let me ask if the other two Commissioners could make a joint statement that you all agree on in terms of a response to this being a question for the record? If you would like to add additional thoughts of your own, I would invite you to respond in writing as a question for the record.

In my last moments, I want to say again that to me, it is very disappointing and discouraging to see safe and safely operating nuclear plants that produce carbon-free power have to close down in order to build and run new carbon pollution generating plants simply because of the market failure of having any value to the carbon-free nature of nuclear power.

I know that is being resolved a bit at the State level. I hope I can continue to work with colleagues to try to get something done akin to our carbon capture utilization and storage bill to encourage the continued safely operating nuclear fleet not have to be artificially shut down at a time when we could certainly use both the electricity, the jobs in those locations, and the carbon-free nature of that power.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you, Senator Whitehouse.

Senator Carper.

Senator CARPER. While he is still here in the room munching on a granola bar, I just want to say I approve this message, approve that message. Thank you.

I want to come back to something Senator Whitehouse raised maybe in a little different way. Maybe 5 or 6 years ago I was privileged to go with a member of our staff to France to take a look at what they were doing with respect to efforts to recycle and reprocess spent fuel to see what lessons there were for us.

I know additional work has been done, I am sure, in France but also here in this country. Can you talk about that a little bit, looking forward and with a respect to what we need to be doing here on this side of the dais, please?

Madam Chair, will you go first, and then we will ask the other members to join in.

Ms. SVINICKI. On the issue of recycling or reprocessing, early in my service on our Commission, I think in 2009, the agency received some expressions of interest from potential developers of reprocessing capability in the United States.

I would say though in the last number of years since then, as a regulator, we have not heard any expressions of anyone interested in development. In 2009 we were asked by the potential industry developer could we update our old regulations on reprocessing and recycling.

Before we even undertook that effort, I think the business interest in doing it diminished. Other than that, it has been a fairly dormant area for us as a regulator.

Senator CARPER. Other members, please.

Mr. BARAN. I would just echo the Chairman's remarks. The 3 years I have been on the Commission, it is not something I have heard anyone propose to move in that direction which may be a reflection of low uranium prices.

Senator CARPER. Commissioner Burns.

Mr. BURNS. I agree with what my colleagues have said.

Senator CARPER. In this regard, is there anything going on in other countries, France or any other countries where they have a fair amount of nuclear that you are aware of?

Ms. SVINICKI. I think for the countries that do engage in reprocessing, it is a fairly stable process they have developed. I am not aware of them proposing any dramatic changes to it. It is pretty stable and known. I think the basic process was developed in the 1970s, and I think it has stayed essentially the same.

Senator CARPER. Thank you.

Could we turn to Fukushima, lessons learned from Fukushima, lessons we learned from that tragedy and actions we have taken here in our country with our own nuclear plants? How are we doing in that regard? Just give us an update, please.

Ms. SVINICKI. The implementation of the NRC's post-Fukushima set of regulatory actions has effectively been accomplished. There was some mention made to seismic hazard analysis upgrades and the institutionalization for us of routine looking at updating of the safety assessments for the natural hazards for the facilities.

Some of the post-Fukushima actions we have taken will have a very enduring footprint at the operating facilities across the country because they require a very consistent focus on being prepared for these very extreme, natural events.

As an observer of the events at Fukushima and what countries around the world have done as they have learned lessons from that, I think there has been a strong emphasis on the fact there are human people responsible. You can have the best set of procedures and response, and you can have exquisite equipment available, but it is the individual responders at the plants who will need to be able to carry that out. I have seen a consistent focus on that from the U.S. industry and also U.S. NRC to make sure that training, procedures, and exercises will be the essential element to the resiliency going forward.

Senator CARPER. Thank you.

Commissioner Baran and Commissioner Burns, would you like to add to that, please?

Mr. BARAN. Sure. There has definitely been a lot of progress on the ground in terms of equipment to address certain accident scenarios. I have traveled to plants all across the country. If you go to a plant, you will see a dome or some other type of structure that is filled with equipment that can be used at any plant in the country, generators, pumps, hoses that would be extremely useful, I think everyone agrees, in the event of an accident scenario. That is all new equipment since Fukushima. That is a concrete manifestation of the effort. Spent fuel pool instrumentation levels, that was something not previously required that is now in every plant in the country.

The long-pull intent has been severe accident capable vents for certain boiling water Mark I and Mark IIs. Those are going to be completed in the 2018–2019 timeframe. Really the only thing else that is kind of outstanding are some of these hazard evaluations which are, in some cases, multi-year efforts.

Senator CARPER. All right; thank you.

Commissioner Burns.

Mr. BURNS. I would just add that in many respects what the industry has built on from the requirements that we imposed after Fukushima actually had some origin in our thinking after 9/11 in terms of the ability to withstand large explosions and things like that.

There was a baseline due to requirements the agency had adopted after 9/11 that were really built on the Fukushima era.

The other thing I might add is that I have had the opportunity to go to a number of nuclear power plants outside of the United States. For the most part, I think our approach is very similar and what is going on in other countries is very similar to what we have been doing in terms of addressing the type of way to basically prepare for the unexpected, the beyond design basis accident. I think worldwide we are pretty much on the same page.

Senator CARPER. Thanks.

When you look at the difficulties we have encountered, they have been encountered in South Carolina and Georgia in the construction of new facilities. I understand in Georgia, they are still under construction, and in South Carolina construction, the work has stopped.

Do you have any idea whether or not some of the lessons learned from Fukushima added to the cost of these projects in a way that sort of led to their slowdown and in one case, stoppage?

Ms. SVINICKI. I do not have any rigorous analysis of that. I would be very, very surprised if that played a role. That does not logically follow to me because the types of actions post-Fukushima are all something well contemplated by the new plants.

I do not think in terms of an increment of additional expense; they would not be significant enough to cause a plant cancellation.

Senator CARPER. Do the two Commissioners agree with that?

Mr. BARAN. I agree. I do not think it was the result of anything NRC did.

Mr. BURNS. I would agree. As I think the Chairman alluded, the passive designs, that is, in effect, the Generation III+, that is the

advantage of the AP1000 and some of the new designs. Those passive designs sort of account for some of those aspects.

Senator CARPER. Is the largest factor that led to the decision not to go forward with the South Carolina project, and frankly, decisions around the country to close or mark for closure a number of nuclear plants, have more to do with the very low cost of natural gas? Is that a bigger factor?

Ms. SVINICKI. I know that the South Carolina Public Utility Commission and the State legislature are conducting a series of hearings. I suspect that when all the analyses are done, there will be multiple contributors to why the project was abandoned.

I think some of them will revolve around project management aspects. Others will be perhaps the Westinghouse bankruptcy as a complicating factor and others, but I suspect there will be multiple contributors to why the project did go through to completion. I know the State is looking closely at that.

Senator CARPER. All right.

Gentlemen, anything?

Mr. BARAN. I don't know that I have anything to add to that other than I think putting aside the Summer plant, I think that is a factor obviously utilities are looking at if they have a combined license to build a new plant, what are the wholesale electricity prices, and are they sufficient to support construction of a new plant? I do think that is a key factor.

Senator CARPER. Our colleagues from Georgia have been supportive of including in tax reform legislation a provision dealing with the section of the Code called 45J, the investment tax credit provision. Are you familiar with that? Do you have any views on that?

Ms. SVINICKI. I am certainly not expert, but I have read the same comments from the constructors of the Vogtle Units who thought the continuation or extension of certain favorable tax treatment is an underlying part of their business case for completing the Vogtle Units, but again, I don't have separate expertise on that. I have just read the same statements by the constructors of the plan.

Senator CARPER. Gentlemen.

Mr. BARAN. No.

Mr. BURNS. No.

Senator CARPER. Last, I like to ask people who have been married a long time what is the secret to being married a long time? I get great and really funny answers. I ask people who have been together 50, 60, or 70 years.

One of my favorite answers is, I explain the two C's, communicate and compromise. In Delaware, we have added two more C's, civility and collaboration. I think that is not just the secret for a long union between two people; it is also the secret for a vibrant democracy and effective leadership.

I said to the Chairman before we started that in the past, I remembered gathering here for oversight hearings with the Commissioners, and they were not happy chapters in your lives or ours. There was a time when the Commission really struggled at working together.

I would just ask the three of you, with respect to the four C's, communicate, compromise, civility, and collaboration, how are you doing?

Ms. SVINICKI. Again, I feel very privileged to serve with the two gentlemen who are here with me. We always welcome new colleagues. I think I have had four chairmen and a lot of different colleagues during my nearly 10 years on our Commission.

Again, Commissioner Burns was so gracious in assisting me in taking over the chairmanship. I am very grateful. I continue to consult with him on matters and say, how did you handle this as chairman.

I would say we are doing very well. I think the secret to getting along is respect. It does not mean you agree on everything.

Senator CARPER. How do you spell that, r-e-s-p-e-c-t?

Ms. SVINICKI. I think it is something Senator Duckworth mentioned, our own safety culture and the willingness to raise concerns. Part of the training in having difficult conversations with colleagues or with your boss is that respect element. That is some of what we emphasize there. I think as a Commission, we try to model that.

Senator CARPER. Commissioner Burns, are you going to sit there and let her say that, get away with that?

Mr. BURNS. Absolutely. Having just reached my 40th wedding anniversary this year, I agree with your characterization of what is successful. I am sure my wife will, too.

Senator CARPER. Mr. Baran.

Mr. BARAN. I agree with my colleagues. The three of us work very well together. We do not always agree on policy matters, and that is fine. That is the idea behind a commission. You have people with different views and different experiences. Sometimes they agree; sometimes they do not. We try to persuade each other.

We are always excited if we can persuade each other. We often find common ground and compromise. We have a lot of decisions where we are 3–0. I think it has worked well, and I am very happy with the colleagues I have.

Senator CARPER. Thanks.

Mr. Chairman, I know I said I only had one more. Could I ask a question with respect to cyber attacks?

Senator BARRASSO. Yes, please do.

Senator CARPER. Earlier this year, there were reports of possible cyber attacks on some of our nuclear reactors, as you know. I would like to ask how is coordination going with the other relevant Federal agencies? There are a number of them including the Department of Homeland Security. How is that coordination going as we help defend our reactors from these kinds of attacks in the future?

Ms. SVINICKI. Our commission of the Nuclear Regulatory Commission and our direct commissioner involvement, I think has a really strong track record. In the entirety of my service on the Commission, we conducted twice a year meetings where we go into the appropriate setting with a representative sampling of our Federal partners who monitor these events very, very closely.

I am not aware that other commissions have that as a routine practice. It allows us to hear directly from intelligence analysts from throughout the Government. I think as a result our con-

fidence in our regulatory response to cyber security is raised because we monitor this very frequently and very directly.

We have our own experts as well, and they are in the room, but I think to invite interagency partners to come and sit with us as political appointees is very important. I am very proud that we do that.

Senator CARPER. Good.

Gentlemen.

Mr. BARAN. I agree.

Mr. BURNS. I agree. It has been very useful. I think it helps our thinking and our preparation as well as for our staff because it is something that is not going to go away. We need to continue to be vigilant about it.

Senator CARPER. Madam Chairman, do you have any advice for us to enable you to do your jobs better, a couple words? A lot of times, I ask a question and people say more oversight. They say more oversight, which is interesting. Any advice for us?

Ms. SVINICKI. I do think the consistent engagement that you have with our Commission as a Committee and the staffs that support you and the work that you do allows the Committee staff, because of the consistency of your interest, to be able to have the time to develop the knowledge and expertise on our issues as an agency.

I think that really benefits us because I know Senators—and their staffs as a result—are pulled in many different directions on any given day. I think the opportunity for your staff to work with us more directly and develop kind of a long term observation of our agency's achievement, progress, and challenges is a helpful back and forth engagement we have.

Senator CARPER. All right.

Gentlemen.

Mr. BARAN. I agree. I appreciate that in my time on the Commission, the 3 years here, we have had so many constructive hearings where we go through both management-type issues and budget-type issues, but also more policy focused issues. I have found it to be very constructive and very useful.

It sounds hokey, but really that oversight is important. We appreciate it, and as someone who worked for the House of Representatives doing oversight work, it is extremely valuable.

Senator CARPER. Commissioner Burns.

Mr. BURNS. I would agree. As I think the Chairman alluded, for us as Commissioners, and that is our day-to-day work, they are not easy issues so the engagement with the staff as well as engagement with you directly, I think, helps us all understand the challenges we have, the concerns you have, and how we can work through them.

Senator CARPER. Thank you all very much.

Senator BARRASSO. There are two final questions, and then we will conclude this.

Chairman Svinicki, Mick Mulvaney, Director of OMB, had a memorandum sent out to the heads of departments of agencies in July of this past year. In the memorandum, he provided guidance for the development of the fiscal year 2019 budget.

He specifically highlighted how and said, "The fiscal year 2019 budget process will give special consideration to bold reform or reorganization proposals that have the potential to dramatically improve effectiveness and efficiency of Government operations."

Is the NRC considering any proposals that might align with what he is recommending in his guidance?

Ms. SVINICKI. Of course our engagement with OMB is in advance of the President's budget roll out in February of next year. There are, of course, sensitivities, but as a general matter, we have been engaging with OMB in the development of our fiscal 2019 budget.

An element of that, as you mentioned, are these reform initiatives and proposals. We have engaged our examiner. She has come back and asked us additional questions. We have been in the process of developing our agency proposals to accompany the President's fiscal 2019 budget.

That engagement has been going on. I understand there may be some additional feedback that we receive in the coming months prior to the budget roll out. When we appear before the Committee next year in support of our budget, we can speak of those specifics at that time.

Senator BARRASSO. For the final question, I called on the NRC to consider implementing the flat fee structure for routine uranium recovery licensing actions. To date, the NRC has taken multiple years, as I mentioned, to establish a pilot program for a sector with only 11 licensees.

I am just concerned the NRC is taking too long to get the program up and running. The agreement States like Texas and Utah already have flat fees in place for routine uranium recovery licensing actions.

Can you talk a bit about the cause of delay and why the NRC cannot use programs already put in place like Texas and Utah as maybe templates for your own program?

Ms. SVINICKI. I agree, Chairman Barrasso, it does seem like a prolonged period but I have come to understand from the NRC staff a couple of things that persuaded me.

The first is uranium recovery is a pilot for flat fee. I think the agency is intrigued about the potential use of flat fees beyond uranium recovery and other areas. As a result, the NRC staff really wants the pilot to be successful.

In order for it to be successful, they need to develop the flat fee estimates with a certain level of fidelity. The best way I could describe this—and the staff has not corrected me, so I hope I am right about this—is we know what recent uranium recovery fees have been, but we do not have a good understanding on what to attribute.

If one cost X million dollars and another cost Y, we don't just want to average X and Y and say that is the flat fee because what if the one that was higher had a lot of complexity? It is not going to be an equitable and realistic flat fee estimate.

I know it seems like a very prolonged period. With the parallel development of Wyoming's agreement State agreement, it may be this was not the best area to pilot given other events.

I think the agency is very committed to exploring flat fees because we think they have promise for other types of licensees as

well. Our commitment is to doing a pilot that will demonstrate that and doesn't just fail maybe for reasons that we did not prepare it properly.

Senator BARRASSO. Members may submit additional questions, as you know, for the record. The hearing record will remain open for 2 weeks.

I want to thank the witnesses for your time and your testimony today.

The hearing is adjourned.

[Whereupon, at 11:30 a.m., the Committee was adjourned.]